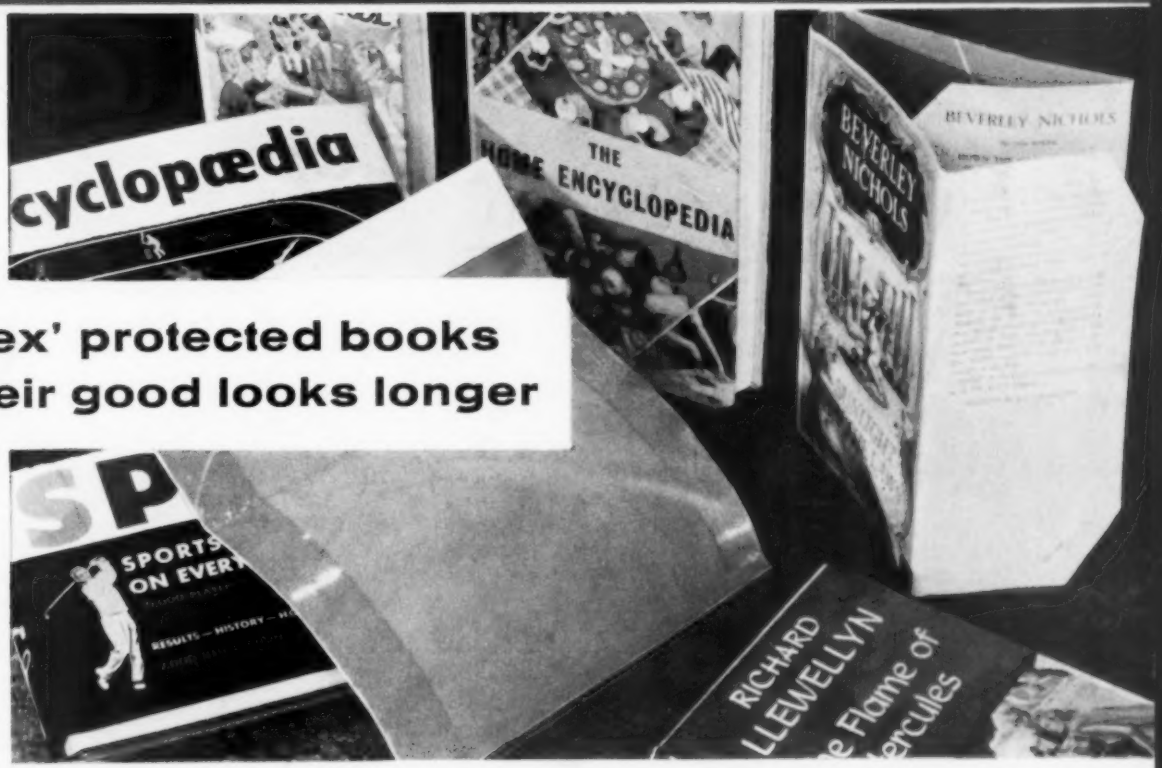
RUBBER and PLASTICS WEEKLY

VOLUME 141 NO. 6 AUGUST 5 1961 ONE SHILLING



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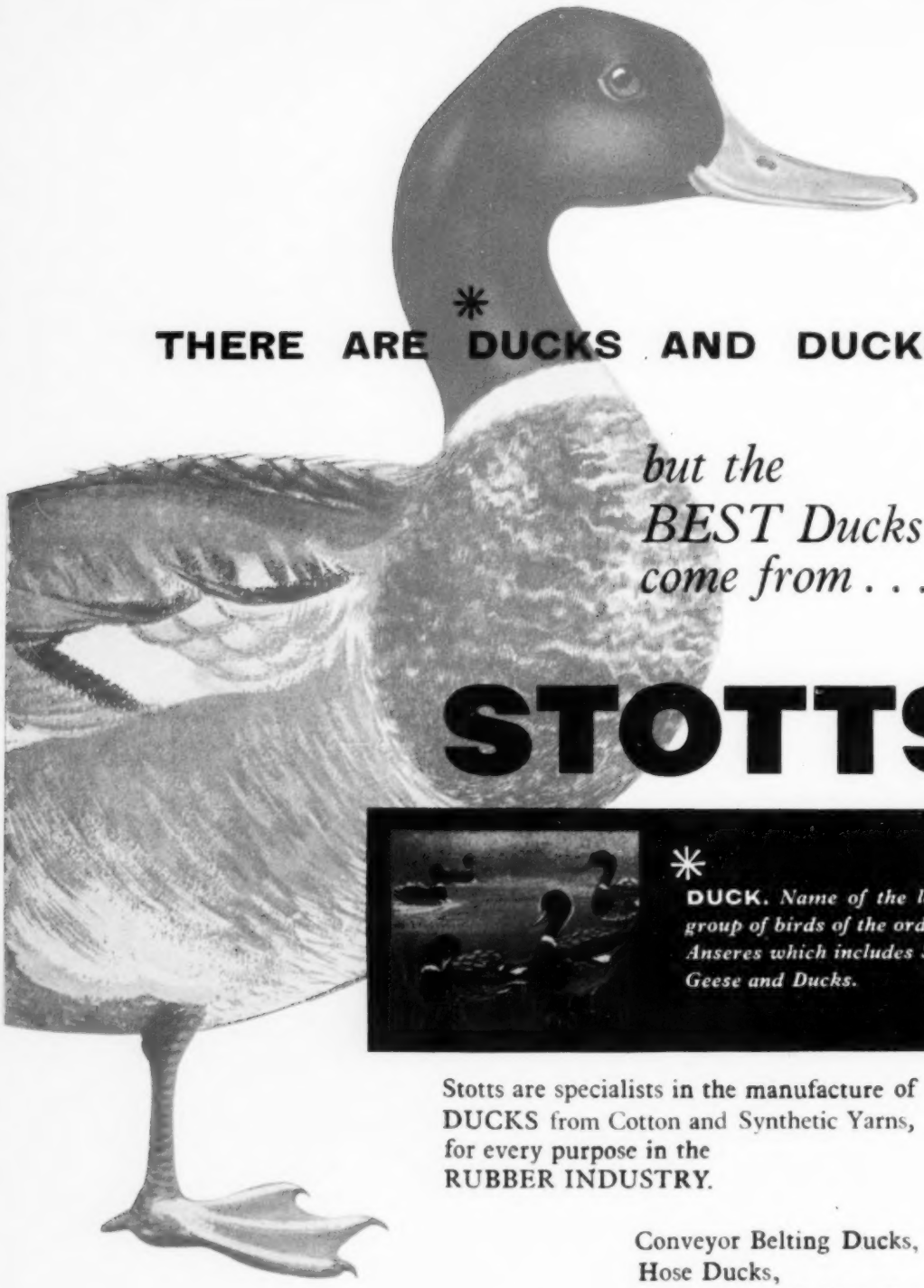

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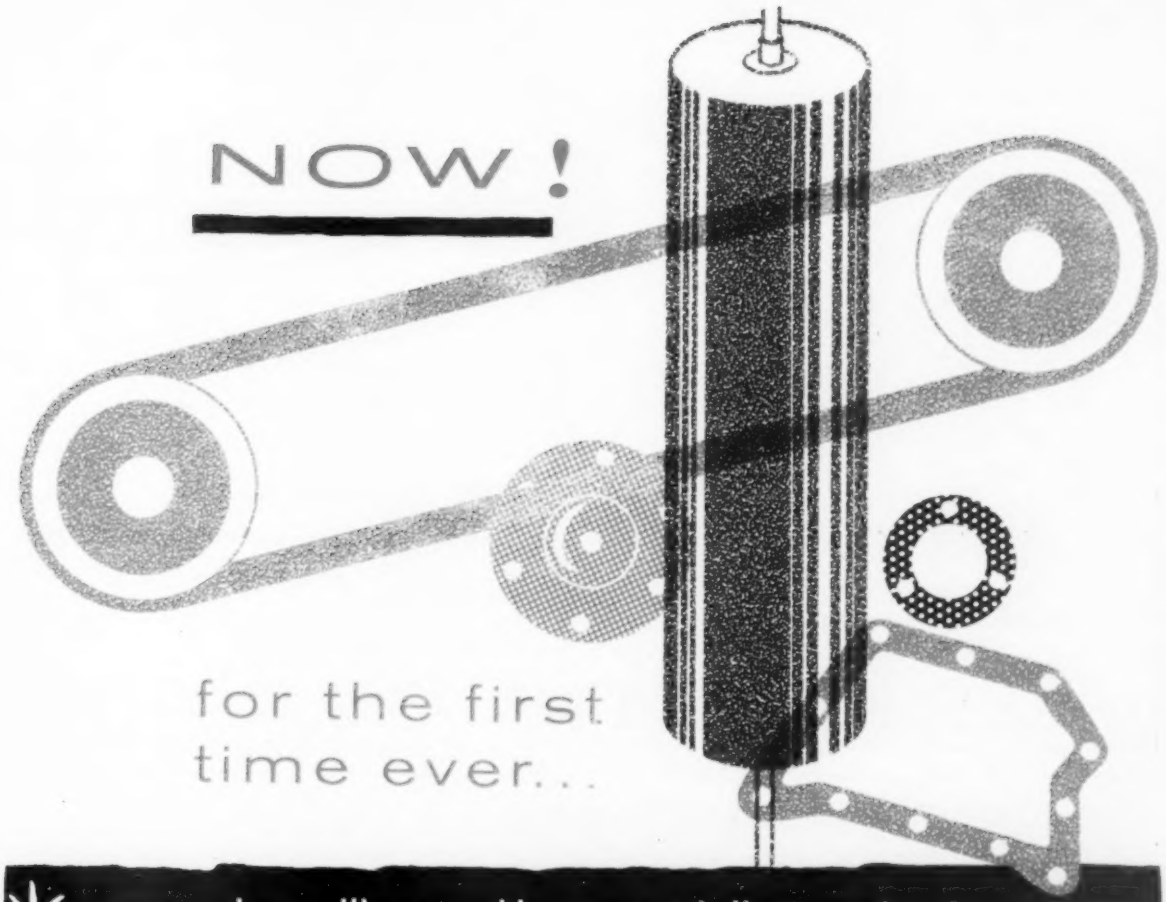

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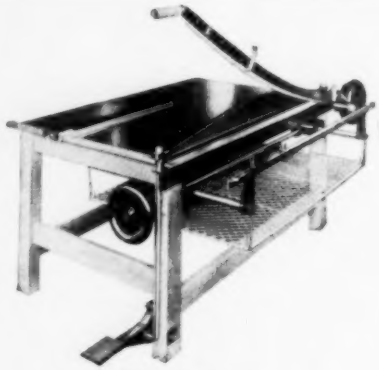

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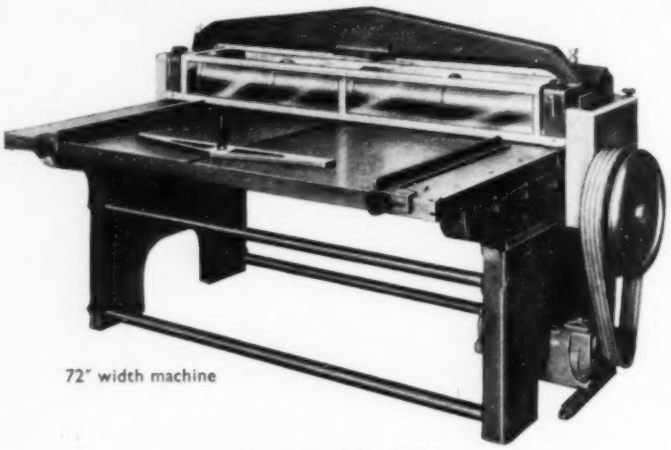

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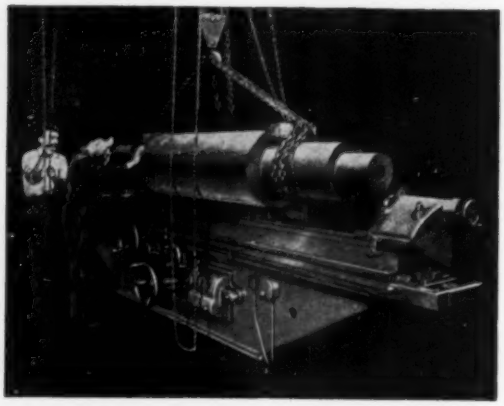

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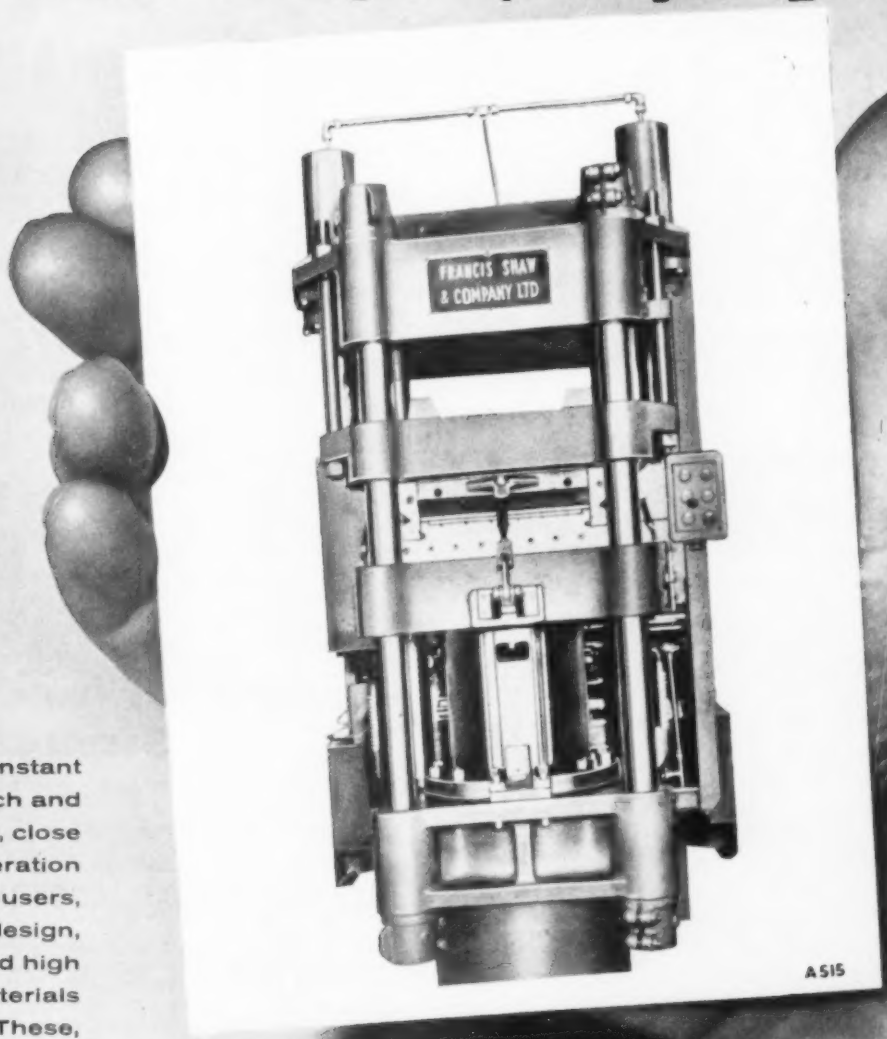

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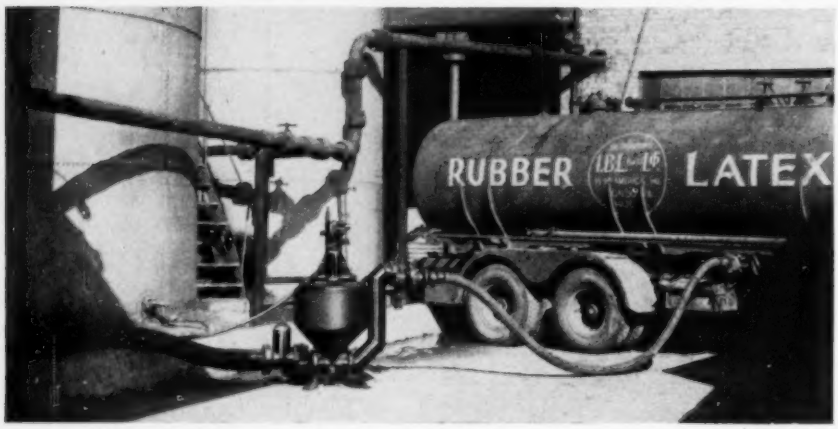

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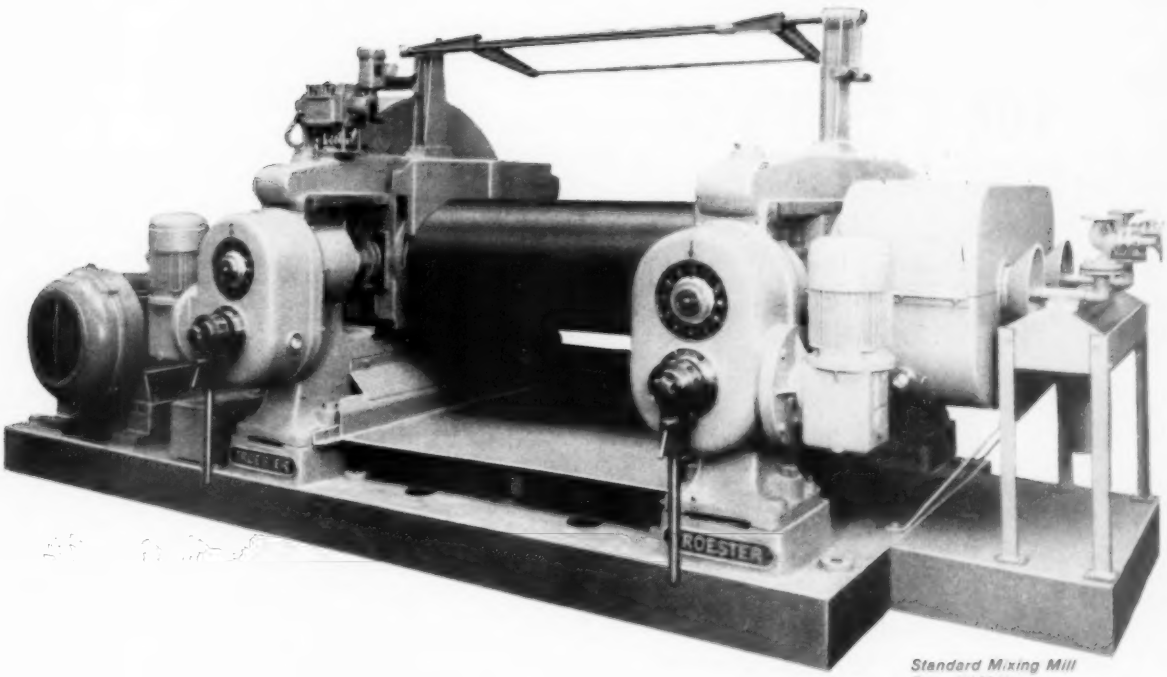

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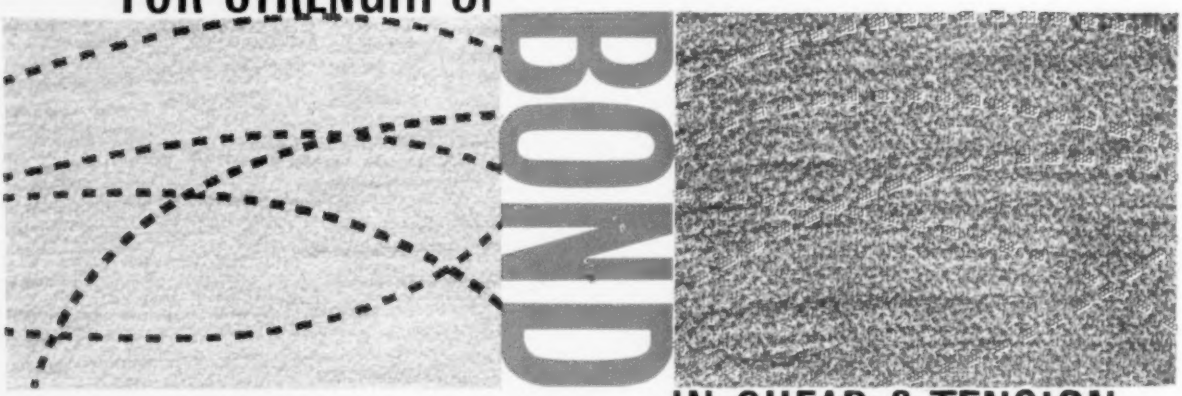

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RUBBER and PLASTICS WEEKLY

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Volume 141 *IN ITS 78th YEAR* No. 6

August 5 1961

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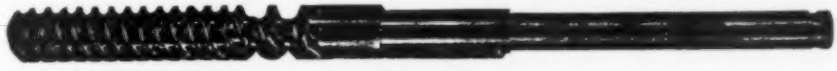

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NOTES of the WEEK

Application for Entry

THE Government's decision to apply for entry to join the Common Market is, we think, a correct one. Correct for the country as a whole; and correct for the polymer industry as a whole. On the eve of Mr Macmillan's speech a most interesting survey of what 37 industries stand to gain from the UK joining the Six was issued by a leading firm of stockbrokers.

This adds up seven economic variables — such as UK exports to the Six and imports from the Six — and uses the equation to establish the relative efficiency of the industries. Rubber is ranked fifth out of the 37 industries, and plastics nineteenth. The survey indicates that both industries stand to gain from the export opportunities and greater economic growth that would come from joining the Common Market.

Of course, all companies in the polymer industry would not be affected in the same way. The position within one very large firm can be used to illustrate this. At the annual meeting of the Dunlop Rubber Co. in May Sir Edward Beharrell, referring to the possibility of the UK joining the Six, said: 'Obviously the divisions and companies within the UK would not necessarily be affected in the same way. For some there would be the excitement of broadening horizons and how best to take advantage of them; for others there would be heightened competition'. He also made the point that association would make available the opportunity for growth, not growth itself. But, overall, the industry would benefit from this broadening of the economic front. Plastics sales figures to Europe reinforce this view.

The total sales of plastics raw materials by the Six and EFTA are nearly equal to 90% of USA sales. The UK sells about 20% more plastics to the Six than to other members of EFTA and, although the UK is by far the largest producer of plastics within EFTA — four-fifths of the group's output — its share of exports to the other member countries is comparatively small.

Commonwealth Polymer Interests

IT is, of course, a long way from formal application to final agreement. The vast thickness of the Treaty of Rome with its articles, chapters, protocols and appendices has to be waded through. And Mr Macmillan has indicated the Government's 'determination to negotiate satisfactory arrangements for the Commonwealth, our EFTA partners and agriculture'. This is to be welcomed. What effects would a merger have on rubber and plastics interests in the Commonwealth? According to studies made by the Economist Intelligence Unit, natural rubber would have a good future. Europe takes at least 45% of Commonwealth rubber. An indirect effect of integration may be the even greater stimulation given to the production of synthetic — but this will happen in any case.

Canada is the only considerable Commonwealth exporter of chemicals and synthetic rubber to Europe. Polystyrene exports from Canada to Germany in 1958 amounted to £1.3m., while the UK took £500,000 of styrene monomer in that year. Synthetic rubber exports to the UK, France and Germany totalled £14.2m. These and similar products are finding smaller outlets as the vast expansion of Europe's petrochemical industry takes place; so integration would simply mean a speeding up of this process. And, it should be noted, Canadian capital is being invested in the Common Market. The projected merger would not, then, have an extremely serious affect on the Commonwealth so far as polymers are concerned. In fact there is a case for saying that the Commonwealth polymer exports would benefit from faster economic growth in the UK.

Dropped Relations

THE Chancellor's demand for a 'pause' has not met with a very enthusiastic response from the Trade Unions. Even if the economic thinking behind the pause is justified, the way of asking for it has been rather clumsy; in balancing his figures the Chancellor seems to have dropped his industrial relations. In the next few months, therefore, relations in industry are going to become even more important.

Good Relations

INDUSTRIAL relations is one of our modern phrases for a philosophy that has existed since Owen. One of the pioneers, so far as rubber is concerned, has been the Northern Rubber Co. Ltd., which celebrates its ninetieth anniversary this year. Frank Pegler, the son of the founder, reduced the standard working week from 60 to 48 hours — all at once — and was thought to be foolhardy for doing so. But the firm flourished and his son, Francis Pegler, was one of the first people to introduce a five-day week.

The same progressive attitude exists today, with the result that the 'Northern' is in as good a position as any firm to take the Chancellor's pause in its stride.

NEWS *Briefs*

FIRESTONE POLYBUTADIENE PLANT IN BRAZIL
DUNLOP JAPAN FACTORY OPENS—AND EXPANDS
DNEPROPETROVSK TYRE PLANT NOW PRODUCING

●**Brazil** — The Firestone Tire and Rubber Co. will operate a polybutadiene rubber plant to be constructed at Recife, Brazil, as part of the industrial development of north-eastern Brazil. The plant will have an annual capacity of 27,500 metric tons of polybutadiene. Construction on the plant will begin this autumn and it is expected to be completed in approximately two years. The Recife facility will be the first of its kind in South America. It is sponsored by a Brazilian government agency, will be built by the Lummus Co. of New York, and will be the third plant in which Firestone will manufacture polybutadiene. A plant at Orange, Texas, went on stream last spring with an annual capacity of 30,000 long tons, and production is scheduled to begin in a plant at Port Jerome, France, late this year. At Recife, alcohol will be derived from sugar cane as the raw material for the production of butadiene; the area is rich in sugar cane.

●**France** — The Belgian concern Solvay and Co. is establishing a polyvinylidene chloride plant at Tavaux in the French Jura. Next year the plant will start producing at the rate of 5,000 tons a year; the eventual capacity will be 10,000 tons a year. The polymer will be sold under the trade name Ixan. Three grades will be produced: WN, for the coating of cellulosic film; WA, for paper coating, and WV, for transparent film extrusion packaging.

●**Argentine** — Argentina exported 3,931 tons of casein during May as compared with 3,733 tons in April and 2,725 in May 1960. This brought total exports for the first five months of the year to 16,491 tons. The main buyer during the month was USA with 2,298 tons.

●**United States** — A two-year capital expenditure programme totalling $180m. for the Goodyear Tire and Rubber Co. has been announced by E. J. Thomas, the company's chairman. Mr Thomas said the programme, the largest in the company's history, covered 1961 and 1962. In 1960, the company spent $75m. on new facilities. He predicted that rubber consumption in USA would reach 1,485,000 tons in 1961, about 70,000 tons below last year's figure. About 1,600,000 tons would be consumed in 1962, of which 72% would be synthetic rubber.

●**Japan** — Although production began on Tuesday (August 1) at Dunlop's newly-completed second tyre factory in Japan, work has already started on its expansion. The factory, which is situated some 23 miles from Nagoya in Central Japan, covers an area of 44 acres and is immediately adjacent to the plant of the Toyota Motor Co., Japan's largest manufacturers of cars, trucks and light trucks. Initial production at the new factory — built and equipped at a cost of £2m. — will be car and truck tyres. The expansion of the Nagoya factory is part of a £5m. two-year scheme by Dunlop Japan which also plans for the expansion and modernization of the existing factory at Kobe.

●**Russia** — Reporting on the Dnepropetrovsk tyre plant, the Soviet news agency Tass stated on Tuesday (August 1) that the factory, now on stream, was the first to have comprehensive mechanization of all rubber mixing processes by computers. It added that a high level of automation and mechanization enabled each worker to turn out about 54lb. of finished product per hour, whereas the corresponding figure at the most highly-developed similar enterprises in the USA did not exceed about 48lb.

●**United States** — A high density polythene plant will be built by National Petrochemicals Corp., a company formed by National Distillers Corp. and Owens-Illinois Glass. The plant, which will use the Phillips process and which is expected to produce 60m. lb. a year, will be built at Houston, Texas.

●**Holland** — N. V. Chemische Industrie Synres, of Hook of Holland (Netherlands) will shortly start the erection on its own site of a plant for the production of phthalic anhydride. The first stage of the new plant, with a 5,000-ton capacity, will be completed by the end of next year. This quantity will be fully absorbed by Synres' plants at the Hook, the subsidiary at Compiègne (France) and that at Barcelona (Spain). In the next few years the output will be increased to 10,000 tons a year.

●**United States** — About 1,400 workers at the B. F. Goodrich Co.'s Miami plant have struck in a dispute over a local supplemental agreement to Goodrich's company-wide contract with the United Rubber Workers Union. The walk-out was said to have halted nearly all operations. Meanwhile, negotiations were reported in progress between management and union representatives.

' — typical of that lot in the plantation factory — anything for a laugh!' — 548

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New Moves in Packaging

I.C.I. AND SHELL ANNOUNCE FILM LINKS

MAJOR moves in the field of packaging were announced this week by Imperial Chemical Industries Ltd. and Shell International. On Monday (July 31) I.C.I. stated that it was 'entering into an association to develop the uses of plastics films in the packaging industry' with E. S. and A. Robinson (Holdings) Ltd. of Bristol.

A bare 24 hours afterwards Shell announced that Metal Box Co. is to join Shell Int. and National Distillers Corp. of New York in operating a plastics packaging factory in the UK.

I.C.I. is subscribing for a minority interest in a new Robinson subsidiary to be called Robinson Plastic Films Ltd., which, together with other Robinson subsidiaries, will manufacture a wide range of plastics film products for the packaging industry. Robinsons is acquiring a minority interest in British Visqueen Ltd., the I.C.I. subsidiary which manufactures and converts polythene and other plastics films.

British Visqueen has a capital of about £2m. and Robinson's shareholding will be 33⅓%. The capital of Robinson Plastic Films is substantially lower than that of British Visqueen, and the I.C.I. shareholding will be 49%.

I.C.I. states that 'the combination of our manufacturing and research techniques with Robinson's knowledge and experience of the packaging industry, will lead to the widest development and most efficient production of plastics films, both old and new, for all packaging uses'.

Concurrent with this announcement, I.C.I. reduced the prices of its grades of polythene (see page 218).

Polypropylene Film

The Shell venture concerns the subsidiary Shorko formed last November by Shell and National Distillers to find additional outlets for plastics film, particularly polypropylene. Shorko and Metal Box have reached an agreement to form a new UK company. This will invest several million pounds in a film factory, which is expected to produce large quantities of polypropylene film.

No location for the factory is given, but it is anticipated to go on stream early in 1963.

The technical know-how of three companies will therefore be brought to bear on the production of the film, and packaging outlets are envisaged in the food and clothing industries.

●Activity in the plastics packaging field has built up strongly over the last year. As well as the plastics raw material manufacturers the paper groups are expanding their interests into the field. Albert E. Reed and Co. Ltd., for example, entered into the plastics container market last November by taking a 60% interest in Reed Plastic Packaging Ltd., formed in conjunction with Polythene Drums Ltd. (*RPW* November 12 1960, 800).

Courtaulds/US Tie-up for Glass Fibre

Courtaulds and an American firm, United Merchants and Manufacturers Inc., have announced a joint venture for the manufacturing and marketing in the UK of glass fibres for reinforced plastics and other purposes.

A joint company is likely to be formed, but no indication has been given of the extent of the tie-up or where the fibre is to be manufactured.

This is the first time that Courtaulds has linked with a US company to manufacture in the UK — although last month the company did the reverse, buying an interest in Koppers Co. Inc., the US plastics concern (*RPW* July 1, 6).

I.C.I. Introduces New Polyurethane Rubber

A NEW polyurethane rubber — Daltoflex 1 — has been introduced by I.C.I. Dyestuffs Division.

Daltoflex 1 is a polyurethane raw rubber designed for processing on conventional rubber machinery. It is cured by means of a liquid isocyanate compound of high boiling point — called Suprasec M — whose low vapour pressure ensures freedom from any toxic hazard during processing. The company says that hard rubbers of outstanding physical and chemical properties are obtained.

Curing is normally carried out under pressure at 150°C. for 10-20 minutes, followed by a short oven cure at 110°C. An accelerator is not essential for curing. The cured compounds obtained are said to be 'markedly superior to natural and earlier synthetic rubbers in tensile and tear strength, abrasion resistance, solvent resistance and in resistance to oxidation'.

Daltoflex 1 compounds are suitable for such articles as oil seals, shoe soles and heels, solid tyres for factory trucks, diaphragms, and for general mechanical applications where a high level of physical properties and/or good solvent resistance is necessary. Extensive use in such applications is anticipated.

Unlike cast polyurethanes, Daltoflex 1 compounds may be considerably reinforced by filling with carbon black, silica or other fillers, using conventional rubber processing techniques.

Back to Work at Speke

Normal work was resumed at the Dunlop Rubber Co.'s Speke factory this week. Last week workers in some departments were sent home early because 27 men in a cycle tyre covering department adopted a 'go-slow' policy.

The men claimed that a new type of fabric used in the tyre covers was more difficult to handle, making them drop behind in their piece-work earnings.

Change of Style

DUE to its extremely rapid expansion the London Rubber Co. Ltd. adopted a change of trading style on Tuesday (August 1).

A new company has been formed, known as London Rubber (Industries) Ltd., which has taken over all the activities — manufacturing, selling, purchasing, etc. — carried out by London Rubber Co. Ltd. at Hall Lane and North Circular Road, at Chingford Mount Road, under the trading style of Lewis Knight and Co., and at City Road under the trading style of Supreme Surgical Hosiery Co.

London Rubber (Industries) Ltd. is a wholly-owned subsidiary of London Rubber Co. Ltd., which continues as a holding company, in which is vested the control and sole ownership of the share capital of all companies within the group.

London Rubber's rapid expansion has been accompanied by a diversification policy. Besides rubber products the group now has interests which include glues and adhesives, wines and spirits, and finance.

I.C.I. Slashes Polythene Price 219
£2m. Plant for Shell Acids .. 219
FBI Chief at FBRAM 218

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STABILIZERS FOR PVC — PART 6

The Choice of Stabilizer

FIELD TRIALS THE FINAL CRITERION

By W. S. PENN, BSc.

This is the last of a series of six articles on pvc stabilizers, the object of which has been to help users choose from the ever-increasing number of stabilizer systems available the one best suited to their requirements. This article deals with miscellaneous considerations which have an important bearing on the final choice, and gives a guide to the simplest method by which such a choice should be made

PREVIOUS articles have described most of the well-known aspects of stabilizers. There are a few other properties, however, which should be considered since they have an important bearing on the choice of stabilizers.

One problem in pvc technology is adequate dispersion of ingredients which includes stabilizers. Improvements in this connexion include the use of stabilizer dispersions and liquid types. The latter are also very important in plastisols, etc.

At one time the relationship of the various ingredients to one another was not regarded as being of any consequence. They are now, however, and many stabilizers are specific to plasticizers and a few to polymer types. These aspects must be studied.

It is now appreciated that stabilizers have a marked effect on some properties. In particular they can cause plate-out and affect printing or heat sealing properties. These aspects are discussed in the present article.

Another important property of stabilizers is their toxicity or non-toxicity. The differences are vital and are described in detail.

Stabilizer Dispersions

Dispersions of stabilizers are used for two main reasons. The first arises over the toxicity of lead compounds. If dust-like toxic powders are added to a mill or even internal mixer, there is a pronounced health hazard. Such powders should, therefore, only be added to open mills if suitable extraction equipment is available. The obvious answer is to use a dispersion of a stabilizer in a suitable plasticizer.

The second reason for using predispersions is to achieve better dispersion of ingredients in the compound. This is always a problem, particularly with comparatively small quantities of ingredients, and the dispersion of stabilizers in pvc is vital or else 'spots' are likely to develop.

Because of these difficulties stabilizer manufacturers supply dispersions of stabilizers in plasticizers. Table 1 gives a list of some of the dispersions commercially available.

The type of plasticizer is not mentioned in Table 1 and often is not disclosed by the supplier. It is hardly important in the 7:1 ratios but may be in the others so that manufacturers should be consulted for details.

TABLE 1
SOME STABILIZER DISPERSIONS

Stabilizer	*Ratio Stabilizer/ Plasticizer*	*Supplier**
Basic lead carbonate	7 : 1	A.L., N.
Dibasic lead phosphite	3 : 1	A.L., N.
Tribasic lead sulphate	4 : 1—7 : 1	A.L., N.
Lead silicate	2 : 3 and 1 : 2	A.L., N.
Dibasic lead stearate	1 : 1	A.L., N.
Lead stearate	1 : 2 and 1 : 1	A.L., N., B.R.
White lead	—	M.
Tribasic lead maleate	1 : 1	N.
Lead salicylate/ basic lead carbonate	1 : 1 : 1	B.R.
Cadmium stearate	1 : 1	A.L.
Barium stearate	1 : 1	A.L.
Calcium stearate	1 : 1	A.L.

*A.L. = Associated Lead Manufacturers Ltd.
N = Novadel Ltd.
B.R. = Boake, Roberts & Co. Ltd.
M = Mersey White Lead Co. Ltd.

Liquid Stabilizers

An extension of the idea of using dispersions is the liquid stabilizer development. This applies particularly to the numerous combinations of cadmium/barium/zinc with epoxy compounds and chelators. An arbitrary selection of some commercial products (which is by no means complete) is given in Table 2.

Toxicity

In many cases it is necessary to avoid stabilizers which are toxic.[1,2] This not only applies to products which are to be used for packaging foods but also to toys for young children.

The following notes are only for guidance. If any doubt exists with regard to a given stabilizer, application should be made to the British Plastics Federation[2] in the UK and the Food and Drugs Administration in the USA.

As a general guide the following types of stabilizer are toxic in some degree: lead, barium, cadmium and tin. The following are usually non-toxic: calcium, lithium, zinc, epoxy with strontium compounds placed in Category 'C' by the BPF.

Although tin compounds are usually regarded as toxic, there is one group which is now accepted as being quite safe. This is the di-n-octyl tin salts completely non-toxic taken by mouth and percutaneously.

Probably the most popular non-toxic stabilizer is calcium stearate, although there are some doubts about its efficiency. Stearic acid might do just as well or even better. However, advantage can be taken of the non-toxic properties of zinc stearate to create a popular synergistic mixture.

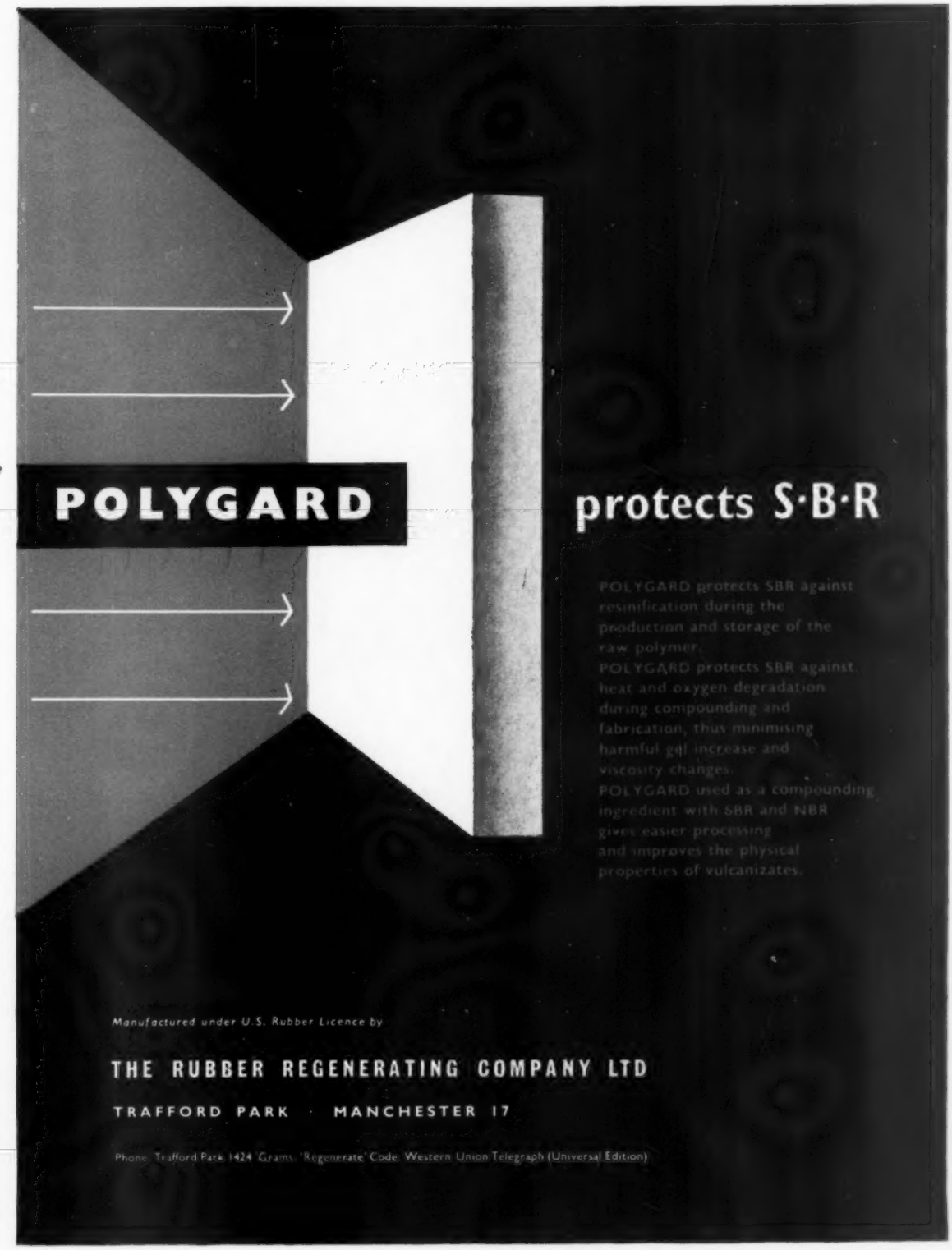
Calcium stearate	..	2.75phr.
Zinc stearate	..	0.25 „
Epoxidized oil	..	6.00 „

Stabilizer Restrictions

There are just a few points which need to be known with regard to the choice of stabilizer systems for different polymers. Suspension type polymers can be used with most systems but emulsion polymers sometimes cause a little difficulty. This probably arises out of the fact that it is more difficult to obtain perfect clarity with emulsion polymers than it is with suspension polymers. The co-precipitated barium/cadmium soaps are satisfactory in emulsion compounds. However, unless maximum clarity is required the choice of stabilizer will not be affected by the polymer.

The plasticizers are much more specific with regard to stabilizer systems[3] although phthalate esters are usually satisfactory with most types. Some of the stabilizers actually stabilize the plasticizer as well as the resin, a good example being the chlorinated types. Some stabilizers, on the other hand, react unfavourably with plasticizers, usually to give undesirable colour formation but sometimes also physical changes.

Some companies recommend special stabilizer systems for phosphate-type plasticizers. Mellite 131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POLYGARD protects SBR against resinification during the production and storage of the raw polymer.
POLYGARD protects SBR against heat and oxygen degradation during compounding and fabrication, thus minimising harmful gel increase and viscosity changes.
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(a thio-tin compound by Albright and Wilson Ltd.) is suggested for phosphate plasticizers in clear electrical compounds; a mixture of Durostabe S50 and Nuostabe V142 (barium/cadmium laurate with an organic chelator by Durham Raw Materials Ltd.) is recommended for high phosphate compositions; epoxy compounds are claimed to improve all stabilizer systems in phosphates; Provinite (barium/cadmium organic complex by F. W. Berk and Co. Ltd.) is recommended for phosphate types and so on.

The most important other group of plasticizers requiring specialized stabilizers are the chlorinated types. A review of the suitability of various stabilizers for Cereclor 42 (a chlorinated paraffin) has been made by I.C.I. Ltd. Details are given in Table 3.

The constant reference to phthalate and phosphate plasticizers arises from the fact that Cereclor 42 is not a primary plasticizer. It is only used with the others to the extent of about 33⅓%.

Special Purpose Stabilizers

One of the most obvious applications of speciality stabilizers is to avoid plate-out.[4] Several suppliers have concentrated on this important problem. It is thought that plate-out is largely caused by the metallic soaps and efforts have therefore been directed to developing efficient non-soap stabilizers. Lankro Mark M (a liquid barium/cadmium complex by Lankro Chemicals Ltd.) is a typical example. Others include Mellite 166 (a zinc complex by Albright and Wilson Ltd.) which helps reduce plate-out in cadmium/barium stabilizer systems; Bar-O-Sil (a complex barium silicate by F. W. Berk and Co. Ltd.) for use with other stabilizers. Nuostabe V-132 (a barium/cadmium complex by Durham Raw Materials Ltd.); Ferroclere 1212A (a barium/cadmium complex with additives by Pure Chemicals Ltd.) and Lankro Mark GS (a zinc liquid complex by Lankro Chemicals Ltd.) for plastisols needing air-release or 'bubble break' characteristics and freedom from mould plate-out.

Another common type of stabilizer is one designed to avoid sulphur staining in general and discoloration in flooring compositions in particular. The latter is usually caused by impurities in the asbestos filler. Lead stabilizers are excluded and one of the numerous barium combinations, particularly with zinc, is popular.

Some commercial products for flooring compositions include the following: Temex 3 a barium/zinc complex (by F. W. Berk and Co. Ltd.); Lankro Mark 225 (Lankro Chemicals Ltd.); Ferroperm 'A' a barium/zinc complex (Pure Chemicals Ltd.) and Ferroclere 42 (Pure Chemicals Ltd.), the latter also being suitable for chlorinated paraffins to retard black spot formation.

Some materials to eliminate sulphide staining are as follows: Nalzin a zinc organic complex (F. W. Berk and Co. Ltd.); Durostabe S18 — strontium stearate, Durostabe S53 — barium/zinc laurate and Nuostabe V14 — a barium/zinc complex (Durham Raw Materials Ltd.); Estabex BC-158 a co-precipitated barium/cadmium soap (Novadel Ltd.); Ferroclere 1234, a barium/cadmium/zinc complex (Pure Chemicals Ltd.) and Lankro Mark KCB, a liquid barium/cadmium/zinc for resistance to sulphide staining, particularly in plastisols and organosols (Lankro Chemicals Ltd.).

TABLE 2
SOME COMMERCIAL LIQUID STABILIZERS

Manufacturer	*Trade Name*	*Type*
Albright & Wilson Ltd.	Mellite 112	Cadmium/barium complex
	Mellite 125	Modified dibutyltin maleate
F. W. Berk & Co. Ltd.	Clarite B	Barium/cadmium organic complex
	Nalzin	Zinc organic complex
A. Boake, Roberts & Co. Ltd.	Abrac 'A'	Epoxidized oil
Durham Raw Materials Ltd.	Nuostabe V.40	Organic chelator
	Nuostabe V.132	Barium/cadmium complex
	Nuostabe V.152	Zinc complex
	Nuostabe V.205	Epoxy compound
Lankro Chemicals Ltd.	Lankro Mark M	Barium/cadmium complex
	Lankro Mark C	Chelator
	Lankro Mark RFD	Barium/zinc complex
	Lankro Mark XV	Cadmium complex
Novadel Ltd.	Estabex 2307	Epoxidized oil
	Estabex 401	Chelator
Pure Chemicals Ltd.	Stanclere DBTL	Modified dibutyl tin dilaurate
	Ferroclere 203	Cadmium octoate with chelator and antioxidant
	Ferroclere 1234	Barium/cadmium/zinc
	Ferroclere 1203	Barium/cadmium with additives

TABLE 3

Stabilizer	*Comments*
Basic lead carbonate	Satisfactory in presence of phosphate or phthalate
Dibasic lead phosphite	Satisfactory in presence of phosphate or phthalate
Dibasic lead phthalate	Satisfactory in presence of phosphate or phthalate
Tribasic lead maleate	Satisfactory in presence of phosphate or phthalate
Tribasic lead sulphate	Unsatisfactory with TTP
Lead stearate	Unsatisfactory with TTP and DOP
Calcium stearate	Satisfactory
Tin salts	Satisfactory
Barium/cadmium laurate with phosphite	Unsatisfactory
Barium/cadmium laurate with epoxy	Satisfactory with phthalate, slight deterioration with phosphates. The addition of an organic phosphite still gives satisfactory results
Barium/zinc with epoxy	Satisfactory
Strontium/zinc laurate with epoxy	Unsatisfactory

Choice of Plasticizer

This series of articles will have made it clear that there is a large number of plasticizers. The choice between them is sometimes difficult and some guidance is necessary.

In the first place it is obvious that certain general factors should be considered in making a choice of stabilizer. The main ones are as follows:

(a) The necessary properties for end usage.
(b) The necessary properties for processing.
(c) The cost.

The first two factors (a) and (b) may be subdivided. It is clear that in all cases the lowest cost material should be used consistent with all other requirements. Subdivisions are as follows:

(a1) Where non-toxic properties are necessary. (a2) Where translucency or transparency is required. (a3) Where best heat and light resistance are required. (a4) Where good electrical properties are required. (a5) Where freedom from bloom is required.

(b1) Where interaction with plasticizers must be avoided. (b2) Where interaction with iron and sulphides must be avoided. (b3) Where high temperature processing is required. (b4) Where plate-out must be avoided. (b5) Where ease of incorporation is vital. (b6) Where the special requirements of rigid vinyls are necessary. (b7) Where the special requirements of plastisols, etc., are necessary.

Any stabilizer chosen for a particular job must satisfy the appropriate requirements chosen from those given above. Take basic lead carbonate as an example. This is virtually the cheapest and most effective stabilizer and yet it could not be used under (a1), (a2), (b1) (in some cases), (b2), (b3), (b5) (in some cases) and

Puzzle Corner

Find the factor common to all these objects

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(b6). Any stabilizer can be treated in this way, once the (a) and (b) factors have been determined, and a fair choice can be made.

A general summary of the stabilizer groups will also help in a choice. The principal factors are as follows:

(1) *Group I. Lead Salts.*

These should be the first choice and only eliminated on the grounds indicated above. Such grounds include toxicity, opaqueness (except Group 1b) and sulphur staining properties. Low in cost.

(2) *Group II. Other Metal Soaps.*

Rarely used alone but in synergistic mixtures. Calcium stearate sometimes an exception.

(3) *Group III. Tin Salts.*

Used where the greatest heat stability coupled with the greatest clarity is required.

(4) *Group IV. Organic Stabilizers.*

Not normally used alone. Epoxy compounds can be used with secondary stabilizers with Groups II, III and V primarily. The phosphites are chelators.

(5) *Group V. Mixed Stabilizers.*

These are the synergistic mixtures used extensively in plastisols, translucent and transparent compounds (although not quite as clear as tin compounds). Many are designed specially to eliminate plate-out and as liquids to have good dispersability.

The above are general guides and it is virtually impossible to be more specific. The final choice of stabilizer is with laboratory and field trials. Two or three should be chosen on theoretical grounds as described above and the final choice is then left to experiment.

Conclusions

The compounder has a formidable list of stabilizers from which to choose. There is one, or a combination of two or more, for nearly every application and he can be quite precise in his demands. Some indication of the method of reasoning to choose a given combination is of value.

It should be repeatedly stressed that basic lead carbonate is still the most common stabilizer and is likely to continue so for many years. Tin stabilizers are the most suitable for the highest heat resistance and clarity. Having stated these two points, the barium/cadmium complexes and their additions offer the widest field for fine variations of all types of property requirements. A study of the build-up of typical systems is of great value.

The first choice to be made is the type of metallic salt or soap to use. Mixtures of barium and cadmium are most common often co-precipitated.

The second choice is between the salts and the soaps. When the latter are used extra lubrication is often unnecessary. More often than not there is too much lubricity. It is, therefore, often preferable to use a barium/cadmium salt complex to which controlled amounts of lubricant in the form of stearic acid are added.

Such a mixture is normally sufficient in itself for stabilization in all compounds including clear types. Additional protection can be obtained by introducing a zinc compound which forms a synergistic mixture, often allowing a reduction in the total amount of stabilizer. For optimum clarity and protection it is usual to add a small amount of organic chelator.

Next, for best colour retention and delay in the development of yellowing the replacement of a *small* amount of the conventional plasticizer with an epoxy resin is desirable.

Finally, for best resistance to light, a special UV light absorber or antioxidant is added. The substituted benzophenone types are quite popular and are used in quite small proportions.

The warning to try out stabilizer systems in the laboratory and factory cannot be too strongly emphasized. The most effective-looking systems may prove to be incompatible with a resin, filler or plasticizer or be unsuitable for some processing operation. The only real way of designing a stabilizer, therefore, is to use the best knowledge available at the time and then give the resulting laboratory-designed stabilizer a field trial.

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[1]Drs. Barnes and Stoner, *British Journal of Industrial Medicine*, March, 1958.
[2]The British Plastics Federation, Report No. 40, 1958.
[3]W. G. Vennels, *Trans. Plast. Inst.*, 1953, **21** (43), 18-30.
[4]H. Verity Smith, *British Plastics*, 1954, **27** (5), 176-179.

W. S. Penn, the author of this series of articles on pvc stabilizers has completed a book on 'PVC Technology' which will be published later this year. This will include chapters on commercial polymers, compounding principles, fillers and stabilizers, fabrication methods, rigid pvc, dispersions, latices and foamed vinyls. The book will be published by Maclaren and Sons Ltd., publishers of *RPW*, and further details will be announced shortly.

Artificial Sky at Cambridge

THE Cambridge University School of Architecture has recently been equipped with an artificial sky dome 25ft. in diameter, having an illumination of 500 lumens/sq. ft. and with the correct brightness distribution. This will allow full subjective studies of lighting conditions to be made on scale models of rooms or complete buildings. It is hoped to provide accurate scientific information on the spacing of buildings, which will replace the rules of thumb which have been written into building bye-laws and town planning theory for many years.

The sky consists of two hemispherical domes, the inner one being translucent, with fluorescent lighting tubes in the space between the two. The translucent dome was built by UAM Plastics, using two standard sizes of triangular panels in Unilux glass fibre reinforced polyester resin. This was designed as if it were a large light fitting, different samples of GRP sheet being fitted into a mock-up of the illumination layout and a panel chosen which gave the best hiding power with a reasonable degree of light transmission. The result is equivalent to a dull overcast sky with a brightness decreasing from zenith to horizon.

The 25ft. diameter Unilux translucent dome for the artificial sky set up for trial at the Watford factory of UAM Plastics

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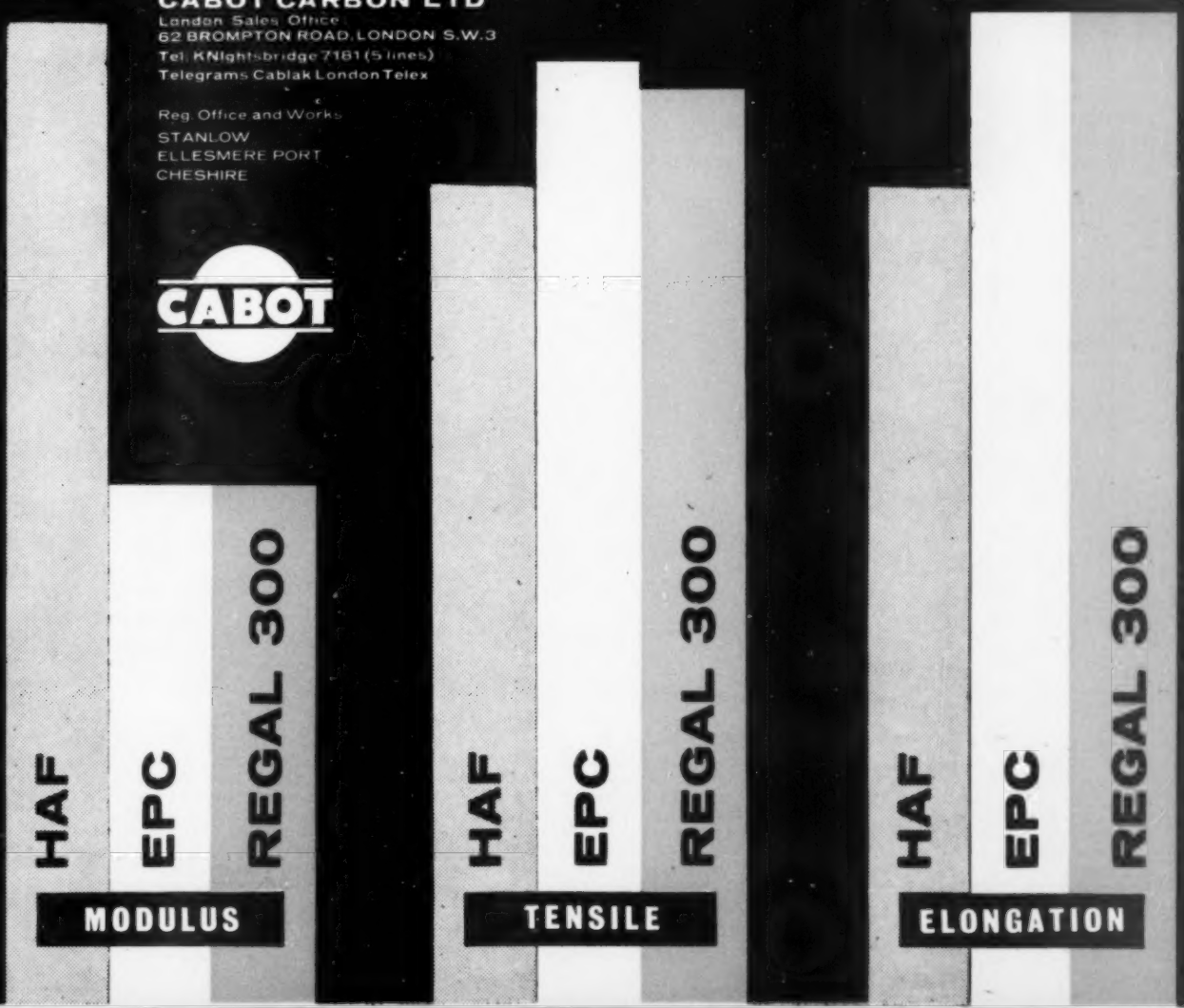

A monthly review of important papers on polymers published in the European technical press

European Technology Review

AUTOMATIC INJECTION MOULDING — GRAFT POLYMERS — LATEX FILLERS

TWO recent Russian patents by V. N. Leont'ev, S. N. Mardon'er and I. M. Zhdanov, deal with injection moulding machines which do not require attention by an operator. In the first,[1] 12 or more wedge-shaped moulds are arranged radially around a vertical drum which rotates with a periodically interrupted motion inside an electrically heated chamber (see Fig. 1). As each in turn reaches the loading position, the wedge-shaped mould is hydraulically expelled from its wedge-shaped holder, opening the mould in the process. Where a core is being used, another piston places this in position, and a third piston replaces the mould in the drum. The latter then rotates to the next position, when a piston is moved up to the inlet port of the mould and the charge of rubber injected into it. The piston is then withdrawn and the mould starts its journey round the drum, finally arriving at the first position mentioned. Here the moulding is removed and the cycle begins again. All movements, including that

By S. H. MORRELL and R. J. MOSELEY, Rubber and Plastics Research Association of Great Britain.

of the drum itself, are controlled by hydraulic means.

The second patent[2] also deals with injection moulding, but in this case the separate halves of the moulds are mounted on two caterpillar tracks which run parallel to each other for a substantial portion of their path (see Fig. 2). The rubber compound is injected hydraulically into the mould at the start of the heated parallel section, and the two halves of the mould are held together by springs whilst vulcanization takes place. On leaving the parallel section, the two halves of each mould are automatically parted and the mouldings ejected by hydraulic means, assisted by suction. The mouldings fall by gravity on to a conveyor belt and the empty halves of the mould eventually return to the loading station to complete the cycle. The authors of the patent have realized that the moulds are in use for only half the cycle, and arrangements are made to couple several units together so that the empty half moulds of one unit can be paired with those of another unit for the remaining half cycle.

Graft Polymers

Two methods of making graft polymers have been described by Berlin, Kronman, Yanovskii and Kargin.[3] In the first, carefully purified natural or synthetic rubbers were milled with ammonium persulphate, and the product, together with 20 times its weight of vinyl chloride and an unspecified amount of water, placed in an evacuated autoclave. Polymerization of the vinyl chloride was allowed to take place at 60-70°C., and then phenyl-β-naphthylamine (PBN) was added as a short-stop.

The products of this reaction were compounded with calcium stearate, litharge, PBN, and process oil on a mill, and then press-moulded. The resulting mouldings were compared with similar mouldings made from

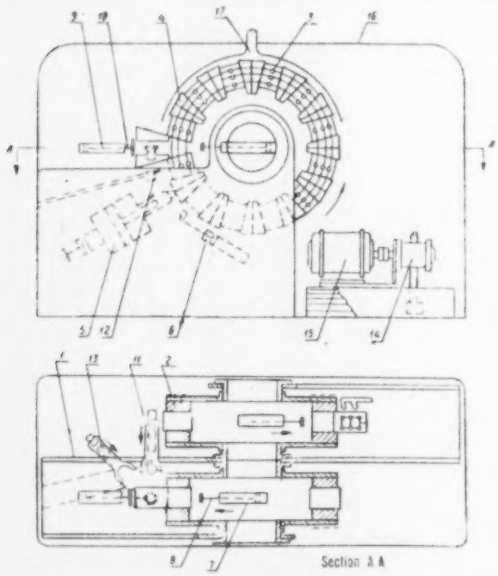

Fig. 1

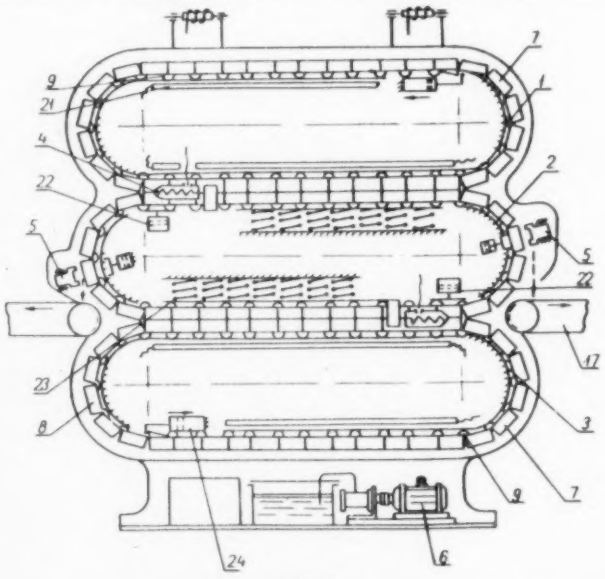

Fig. 2

Fig. 1.—1. Frame. 2. Vulcanization drum. 3. Wedge-shaped mould cavities with removable heating elements. 4. Moulds. 5. Hydraulic cylinder for injecting stock into moulds. 6. Ratchet mechanism for rotating the drum. 7. Hydraulic cylinder with piston (8) for removing mould from cavity. 9. Hydraulic cylinder with piston (10) for inserting mould into cavity. 11. Hydraulic cylinder for feeding and packing insert. 12. Hydraulic cylinder for lifting articles out of mould. 13. Hydraulic cylinder for removing articles from machine. 14. Hydraulic pump. 15. Electric motor. 16. Thermally-insulated housing. 17. Exhaust vent. Fig. 2.—1, 2 and 3. Endless chains. 4. Charging apparatus. 5. Stripping device. 6. Electric motor. 7 and 8. Moulds. 9. Supporting rollers. 17. Take-off conveyor. 21. Radiant heating elements. 22. Hydraulic ram for closing moulds. 23. Helical springs for keeping moulds closed. 24. Hydraulic cylinder for periodic rotation of moulds

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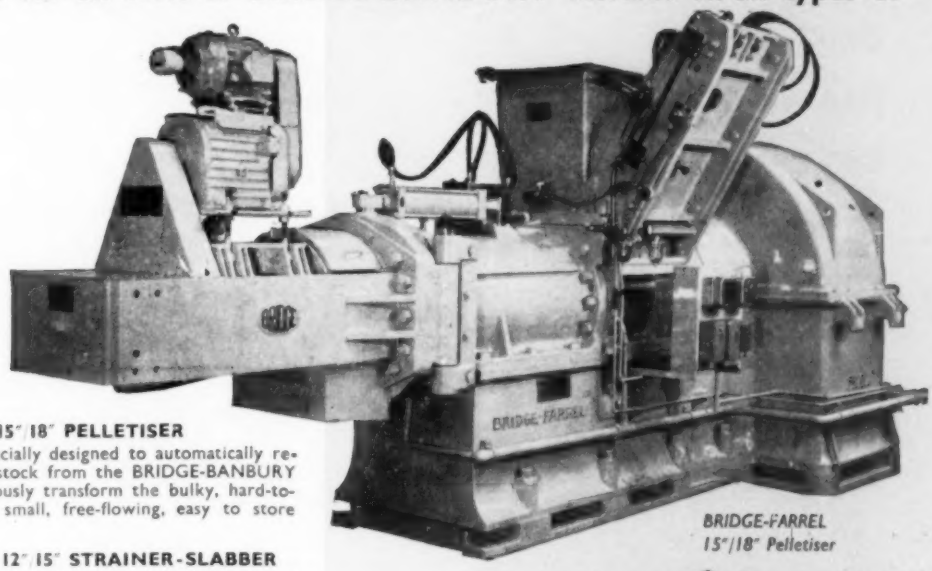

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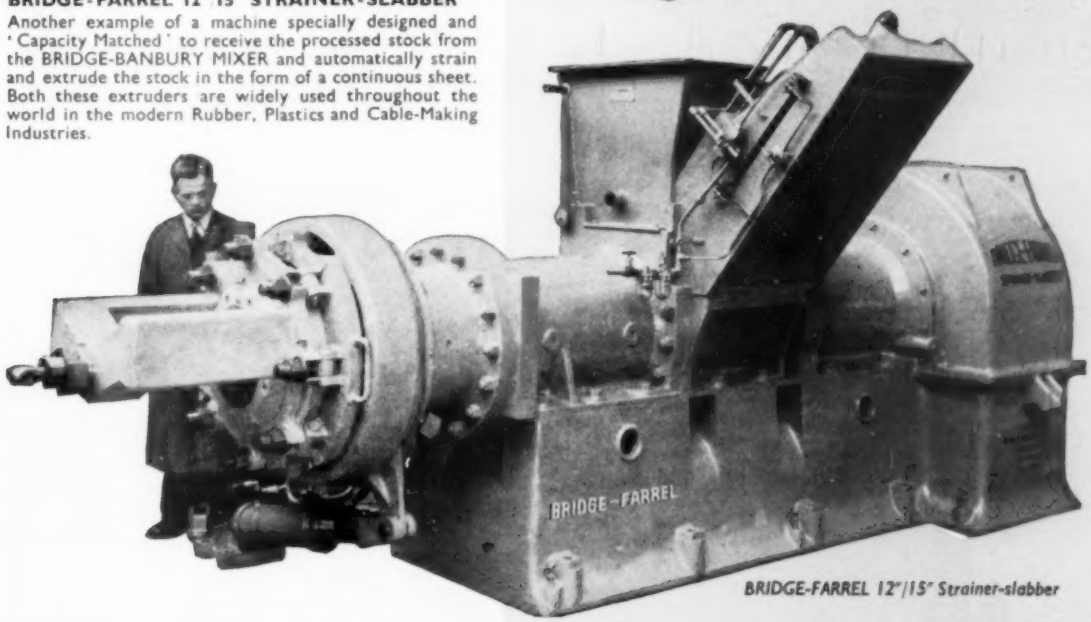

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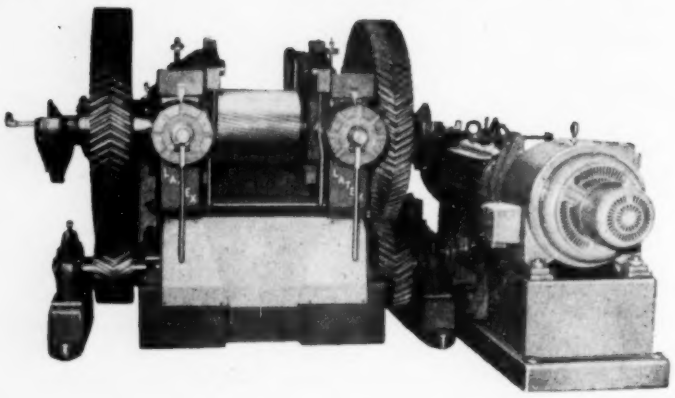

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unmodified pvc in the same compound. Although little change in tensile strength and impact strength occurred, the elongation at break was markedly depressed and the softening temperature decreased. The change in the latter property was greatest for natural rubber, polyisoprene, polybutadiene and nitrile rubber showing smaller depressions of the softening temperature. Attempts to isolate the graft polymers from the reaction mixtures by solvent extraction proved futile, the products obviously containing a mixture of depolymerized rubber molecules and molecules of pvc of low-molecular weight as well as cross-linked polymers. The authors comment, however, on the fact that when nitrile rubber was used as the basic polymer, a portion of the resultant moulding was insoluble in cyclohexanone and evidently contained a high proportion of cross-linked structures, presumably rubber molecules linked by short chains of pvc. Attempts to prevent the formation of these cross-linked structures by the addition of modifiers such as chloroform or carbon tetrachloride inhibited graft polymerization altogether.

The second part of the paper describes the products obtained by the high-temperature mastication of pvc with 10% by weight of natural rubber, polybutadiene, polyisoprene, polychloroprene, or nitrile rubber. These were then compounded in the same way as the previous products, moulded, and tested. Grafts of pvc and natural rubber or butadiene rubber showed comparable impact strength with decreased tensile strength and elongation; synthetic polyisoprene rubber gave a diminished impact strength as well. Polychloroprene rubber, however, gave a product of double the impact strength and comparable tensile strength and elongation, while nitrile rubber gave a graft polymer with four times the impact strength of the original pvc, the same tensile strength and slightly greater elongation.

The authors compared the properties of the graft polymers and noted that the non-polar elastomers lowered the strength of the pvc whereas the polar rubbers enhanced it. They suggested that the improvement brought about by butadiene-nitrile rubber was due to hydrogen bonding between the rubber and the pvc.

Latex Masterbatched Fillers

Two papers[4] by Shvetsov, Pisarenko, and Novikov described the properties obtained from nitrile rubber vulcanizates containing respectively calcium silicate and aluminium hydroxide, which had been incorporated in the latex phase, and compared their properties with compounds obtained by incorporating the filler on the mill. They gave to such rubbers the names 'silicate-nitrile' and 'aluminate-nitrile' rubbers.

Unvulcanized compounds of (82:18) nitrile rubber in which calcium silicate was incorporated on the mill showed Defo values varying from 1,500g. at zero loading to 3,000g. at a loading of 60pbw. If the calcium silicate were added in the latex phase, however, the Defo value was increased to nearly 5,000g. A higher nitrile rubber (74:26) showed the same range of values when mill mixed, but when latex masterbatched, the Defo value increased to over 5,000g. Yet, the authors stated, the stocks were no more difficult to process for the secondary rubber-filler bonds were readily broken on heating.

When vulcanized, the compounds of both rubbers prepared by latex masterbatching showed about three times the tensile strength of those made wholly on the mill, and higher elongations. The modulus of the former ranged from 1½ to 3 times that of the latter, depending on the loading, but the tension set was increased slightly. The tear strength of the latex compounds was nearly twice that of the mill-mixed compounds and the abrasion loss was correspondingly diminished. There was no great difference in resilience, suggesting that the heat build-up would also be comparable. The results of flex-cracking tests suggested that the life of vulcanizates filled at the latex stage was several times greater than when the filler was introduced on the mill: they were also superior on heat ageing.

Compounds of aluminium hydroxide and nitrile rubber showed behaviour in the unvulcanized condition similar to those in which the filler was calcium silicate: the range of filler loadings was, however, extended to 80 parts by weight. The latter gave Defo values of 5,750g. (82:18 copolymer) and 7,200g. (74:26 copolymer) for latex masterbatched compounds compared with 3,450g. and 3,750g. for mill-mixed compounds.

The tensile strength of mill-mixed vulcanizates of various loadings remained constant at about 600psi for the 82:18 copolymer and 750psi for the 74:26 copolymer, while the corresponding values for the latex masterbatched vulcanizates ranged from 1,800 to 3,000psi (82:18) and 2,200 to 3,600psi (74:26) respectively. Once again, latex masterbatching gave higher elongations: with the 74.26 copolymer these even reached 800% at high loadings. The modulus showed similar behaviour to that of the calcium silicate vulcanizates: the tension set of the higher loadings mixed by the latex masterbatch method, showed very much higher figures than those of the mill-mixed vulcanizates. Once again, the tear strengths of the latex-masterbatched compounds were about twice that of mill-mixed compounds, with corresponding reduction in the abrasion loss, and there was little difference in resilience between the two series of compounds. Superior resistance to flex-cracking and heat-ageing were also claimed for the latex-mixed compound.

The above results are very interesting and it would seem that the latex masterbatching of other white fillers is a subject well worthy of investigation by the manufacturers of synthetic rubber.

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[1]USSR Patent 117680; RAPRA Translation 860.

[2]USSR Patent 119331; RAPRA Translation 861.

[3]A. A. Berlin, A. G. Kronman, D. M. Yanovskii, and V. A. Kargin, *Vis. Soed*, 1960, **2**, 1188-1192; RAPRA Translation 870.

[4]V. A. Shvetsov, A. S. Novikov, and A. P. Pisarenko, *Kauchuk i Rezina*, 1959, **18**, No. 12, 4; 1960, **19**, No. 4, 12; *Soviet Rubber Technology*, 1959, **18**, No. 12, 6; 1960, **19**, No. 4, 12.

Polyurethane Pipe Insulation

A polyurethane pipe insulation material designed to reduce installation costs and for use for hot, cold and low pressure steam working is now being marketed by Semtex Ltd. Called Foamflex, it is made in lengths of 9ft. 9in. It is off-white in colour and is designed to fit pipes of the following nominal cores (in.) to comply with BS 1387:1957: ⅜, ½, ¾, 1, 1¼, 1½, 2, 2½, 3, 3½, 4.

The depth of cover complies with the requirements of BS 1334:1959.

In installing the sections are supplied slit longitudinally down one side, and are slipped over the pipe, the joints being sealed with a special adhesive.

FBRAM Guide to Specifications

A new edition of the Federation of British Rubber and Allied Manufacturers 'Guide to the Drafting of Specifications for Rubber Products' is now available.

It can be obtained from the FBRAM at 19-20 Berners Street, London, W.1.

VIEWS and REVIEWS

Integration

THE process of integration creeps on. How far should it go?

The Federation of British Rubber and Allied Manufacturers has just issued its *President's Review 1959-61*. (Copies can be obtained from the Director, FBRAM, 19-20 Berners Street, London, W.1.)

H. G. W. Chichester-Miles begins his review by emphasizing the atmosphere of change in the rubber industry, particularly in the matter of raw materials, and the need for the industry not merely to accept change but to welcome it. He points out that 'the Research Association and the National College, our sister organizations, have both extended their terms of reference to cover the entire field of high polymer technology; and some closer association with the plastics manufacturers might be valuable from our point of view also'.

It is clear that both the RAPRA and the NCRT, though starting from the rubber side, were so placed as to make possible not merely closer association but actual integration. That was all to the good, but neither the FBRAM nor the IRI is in the same position; at present they can only seek close association.

The IRI and the PI have already spent a long time in working out the details of their association. Here, at least, is an offer from the rubber Federation.

Not Coalescence

Integration must come. The raw materials and processes (with differences which serve to underline the basic similarities) and the finished products are so similar as to be logically all part of one industry, with different sections, or sides, or parts. This much is widely accepted. It is in the details that difficulties arise.

As Bohun QC says in *You Never Can Tell:* 'There will be no difficulty about the important questions. There never is. It is the trifles that will wreck you at the harbour mouth'.

Apart from personal considerations, which are many and serious, there is, in some places, an undesirable misinterpretation of the word 'integration'. It does not mean coalescence. In essentials there must be no 'merging' of individuality. Both sides must work together, should go forward as one, should eliminate duplication and overlapping, should help each other by offering and accepting common services, should be geared together for united effort in common fields.

There is ample room for wide divergencies in materials and products, for personal contributions. Do not let us quarrel over names. It may be that we are concerned with 'polymers' or 'high polymers' or 'rubbers and plastics'; it may be that we need new words like 'hipolymers' or 'lopolymers' or 'plastix', or integrated, portmanteau words like 'rubbintics' or 'plasinters' (though I hope not). Such things may be stumbling blocks. They must be overcome, for working together is more logical and profitable for us all. The obstacles to it are not in the field of technology.

Uniformity of Raw Materials

The FBRAM *President's Review* goes on to plead — wisely, I think — for less government restriction of production and for more encouragement of initiative. It discusses the recent reorganization of membership of the FBRAM. It is pleasant to learn that the hard work put in by the Executive and by Stuart Covell and his staff has, in the president's words, 'proved an immediate and unequivocal success'.

The Federation, through its Materials Supply Committee, has achieved a notable success in bringing greater order and consistency into the marketing and supply of natural rubber. 'All types of rubber offered on the market in any substantial quantity have now been brought under a uniform scheme of internationally agreed and defined grades, and arrangements have been made to keep the system permanently up-to-date'.

The president pays tribute to the hard work done here by Maurice Baker, the chairman of the Materials Supply Committee and a director of the Firestone Tyre and Rubber Co., and the new president of the FBRAM.

Getting What You Pay For

A new *Green Book* describing the grades of rubber and also samples of the new grades will be ready, it is hoped, by the end of this year or the early part of next. There is no need to put up with inferior or substitute grades. The Federation's booklet, *Natural Rubber Grades and Contracts*, will help manufacturers to save money now being lost to them by carelessness or ignorance of the available grades and the means of ensuring that these are supplied, that they get what they buy.

Other aspects of the work of the FBRAM referred to by the president are the Technical Committee's valuable work on standards and specifications, the work of the Overseas Committee (now very important in relation to the Common Market), and Publicity, which has valuable achievements to its credit in providing technical matter about rubber to the general and trade press.

Polymer Education

Another kind of periodical review, an annual one, has just been issued by the National College of Rubber Technology, Northern Polytechnic, Holloway Road, London, N.7. It describes one, perhaps the chief, way in which the industry and the government are setting about providing for the future needs of the industry in trained technologists. It outlines the scientific and technological courses in rubbers and plastics, available at the Northern Polytechnic. I have been receiving it for years and have always read it with interest and enlightenment.

It is called *Polymer Technology*, and I hurry to say that despite that title and the inevitably technical nature, in one sense and another, of its contents, one thing I like about it is that it is not afraid of the lighter touch. That is one way of putting the main aim — teaching polymer technology — in its connotations.

It seems to me part of a true education, especially for scientists, to learn to be sober without being solemn,

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

precise without being precious, and conscientious without being constipated. Indeed, I regard a sense of humour as an indication of breadth of vision, and its absence as a sign of self-importance.

Enormous Field Well-covered

Whenever I want to see the extent of the ground covered by our industry, I turn to *Polymer Technology* and read the synopses of the courses. Chemistry, organic, inorganic and physical; physics, electricity, light, heat, mathematics; polymerization, structure and properties of polymers; physical and chemical testing; machinery and equipment; latex technology; textiles; rubber products; thermoplastics, thermosetting materials . . . all this, and much more, they teach at the National College.

The staff comprises: a Head of the College, Dr F. H. Cotton, a deputy head, a reader in polymer science, five senior lecturers, 11 lecturers in polymer science and technology, four instructors in polymer technology, and seven visiting lecturers, together with several laboratory assistants. A most impressive list.

The National College has a variety of kinds of courses. Six full-time courses, an interesting 'Collind' course based on three alternate years as full-time students with the intervening years at work in industry. There are sandwich courses, part-time courses, evening courses, and special, short, full-time courses. Students may also be approved to carry out polymer research at the National College.

There are a number of scholarships, exhibitions, grants, and awards, and even research fellowships. Details are set out in the brochure, which ends with five or six pages of popular description of polymer science and technology — an interesting piece of writing *per se*, but of doubtful value in this booklet.

I am sure that it is not merely the operation of Parkinson's Law that gives the constant, annual reader the impression that year by year the National College increases in size and authority. Serving an industry like ours, it must do just that. The supply of polymer technologists must be kept up, must indeed increase because we are an industry calling for technical and scientific skill and initiative, a 'new' industry in the sense that we are now just beginning to understand the scientific bases on which our commercial success has been founded. Our future is full of promise, if we have enough young men of the right calibre and training coming forward to exploit our new understanding.

This situation calls for a National College, strong in numbers, buildings, equipment, learning, and policy. The brochure shows that we have it.

Better Reflection

A new and unusual type of application for plastics is technically examined and discussed on pp. 245-6 of the June 1961 issue of *Der Plastverarbeiter*, Vol. 12, No. 6. It is by R. Schmitt and concerns light-reflecting surfaces made by coatings of tiny, reflecting, transparent beads.

Such surfaces find particular application for cinema projection screens. These used to employ glass beads but had a striking shortcoming in that the efficiency of reflection was confined to a comparatively small angle on either side of the incident light, in fact, to a total angle of about 60°. Outside this angle — as many operators of home projection apparatus know — there is a sudden and large falling-off in the intensity of the reflected light.

R. Schmitt reports photometric experiments made with screens using beads of polystyrene and of polymethacrylate, of diameters less than 0.3mm., stuck on to a pvc surface painted with TiO_2. He found them both to be better than glass beads.

At certain angles, the polystyrene beads produced spectral colours which did not favour their use for cinema screens but left them applicable for other purposes.

The methacrylate beads were excellent, much superior in optical properties to glass beads, though within about 20° of normal they reflected about 10% less — an insignificant loss. Beyond this, the percentage reflection was consistently higher than with glass and they did not show the sudden large drop characteristic of glass beads. Even at an angle of 70° to the normal, they showed a 50% reflection.

This opens up possibilities not only for light-reflecting screens but in the growing field of traffic signs and out-of-doors advertising.

Possible Cause of Explosions

Kunststoffe, Vol. 50, No. 5, has a long paper on pp. 267-76 about the mechanism of electrical tracking on insulated surfaces. The authors, E. F. Richter and W. Knittel, reproduce oscillograph photographs of tracking currents and describe an experimental investigation of the effects of the discharge of such currents in an atmosphere of air/toluol vapour. They contrived to record readings just before, during, and after the explosion, and although, after testing 57 different insulating materials, they were unable to correlate these results with the explosibility, they are developing a new test method which is promising.

Another possible cause of an explosion is referred to in the editorial, entitled 'Secrets,' of *l'Officiel des Matieres Plastiques* for July-August 1961, and there attributed to an American source. It is to send into your competitor's factory a spy disguised as an inspector of fire risks!

Grinding

In a recent issue of *Revue Generale du Caoutchouc*, P. Korda contributes a description of a machine for grinding or granulating plastics and rubbers based on intermeshing grooved rolls which exert considerable force on the material run between them, much greater force indeed than given by the same expenditure of energy on an extruder or press. Arrangements are provided for heating (needed by polythene) or cooling (needed by pvc), and a range of finished sizes, from granules to a powder, are possible.

CHARLES JENNINGS

Forward Planning for Industry

SIR NORMAN KIPPING AT FBRAM ANNUAL MEETING

THE Chancellor of the Exchequer's budget ideas on planning should meet with 'some constructive response', said Sir Norman Kipping, director-general of the Federation of British Industries, at the annual meeting of the Federation of British Rubber and Allied Manufacturers on July 27.

In discussing the Chancellor's 'big' budget speech, Sir Norman said he hoped that Federation members would read the whole speech, and not just the Press extracts. He pointed out that the Chancellor had indicated that he hoped, in consultation with industry (meaning both sides), to make a real effort to work up projections five years ahead, about prospects and plans for industrial expansion. The ideas of one industry would interact or depend on others, and the collation of these studies should give valuable guidance on the management of our economy as a whole.

Sir Norman referred to the FBI Conference at Brighton in November 1960. It had led to the formation of a committee under Sir Hugh Beaver, which, he added, had been conducting a study on what might be done to keep a continuing examination going, right through industry, on the long-term problems of growth.

What Rubber Might Do

'In view of the Chancellor's remarks, I have no doubt', stated Sir Norman, 'that within a week or so we will be asked to go and have a talk with the Chancellor on how to set about such an attempt. I feel there is a wish, a mood of willingness in industry, to make an effort of this kind, to try to introduce some kind of organized thinking about the course which events are taking, in the hope of not perpetually having to take emergency measures to meet recurring crises.

'I wonder what the rubber industry might do about it. I wonder, supposing your industry were invited to consider — in a vacuum — what it would think was the probable trend of its own affairs in the course of the next five years. Of course, you will say, "How can we do that until we know what the motor industry thinks?" or "How can we do that until we know what is Government policy with regard to investments?" There are so many of these conditional questions that perhaps one might feel inclined to say there is nothing we could do. But supposing simultaneously the motor industry, and many other industries, were to make a similar attempt to project their ideas of where they thought their industry might go in the course of five years, and if these findings began to be compared with one another so that there began to be talks between the rubber industry and the motor industry, could there not be built up out of this something which is better than nothing? Something which would give some sort of guide, which for the first few years might be full of errors, but which over the years might begin to get somewhere? It is not with the idea of introducing planning controls that one wants to go along these lines, but in order to have a better guide to things that are out of gear with one another'.

Lines of Reasoning

Sir Norman suggested to the Federation that if the Chancellor was reasoning along these lines, he really should meet with some constructive response.

Maurice Baker, a director of the Firestone Tyre and Rubber Co. Ltd., who took office as the new president of the Federation, paid tribute to the retiring president, H. G. W. Chichester-Miles. 'The reorganization of the Federation membership structure naturally made Mr Miles's last year of office a particularly arduous one', he said, 'and, if in the last instance the director may be said to have been the architect of the reorganization, Mr Chichester-Miles has undoubtedly been its inspiration and conscience'.

Referring to the economic situation, Mr Baker said that there were factors that would undoubtedly pose new problems both on imports of raw materials and exports of manufacturers' articles, making the need for a Federation greater than ever before He reminded members to use the Federation services that were available and the specialized knowledge of the director. 'In the past there have been instances of members asking, on the one hand, what real benefit they get from the Federation, while, at the same time expressing great concern about their inability to solve a problem that the director is already handling. . . .'

From the floor of the meeting Mr Frankenburg welcomed the new president in a short and amusing speech.

Reviews of the year's work by chairmen of the various Federation committees were given, and the meeting concluded with two films, one a pertinent discussion on the Common Market, and the other a colour film of Dunlop's new rubber plantation in Nigeria.

●H. G. W. Chichester-Miles's review of his term of office, 1959-61, appeared in *RPW* July 22, 135, and a portrait of the new president, Maurice Baker, in *RPW* July 29, 164.

Filon Conference

BIP Reinforced Products Ltd., of Streetly Works, Sutton Coldfield, were hosts this year to the 'International Filon Producers Association Conference', held in London recently. Twenty-three delegates took part from seven different countries, ranging from Japan to Brazil.

Filon — polyester/glass structural sheeting — was first marketed in the US in 1951. BIP Reinforced Products, a member of the BIP Group, started making Filon in this country in 1957. World production of Filon will soon reach 10m. sq. yd. a year.

Rigid Glass Fibres

A glass fibre claimed to possess approximately 50% greater rigidity with no sacrifice in strength has been developed for the US Air Force by Owens-Corning Fiberglas Corporation.

Known as High Modulus Glass, the new fibre will permit weight savings in the development of aerospace vehicles and missiles through its use as a reinforcement in structural plastics laminates. Use of the material should be advantageous wherever increased stiffness in reinforced plastics is required. One promising potential use will be in reinforced plastics filament wound rocket motor cases.

Laminates for Sierra Leone

An order for £280,000 worth of passenger stock has recently been completed by the Gloucester Railway Carriage and Wagon Co. Ltd. for Sierra Leone Railways. Bakelite laminates are used on the interior walls of all the carriages.

I.C.I. Slashes Polythene Price

OTHER COMPANIES TO FOLLOW SUIT

FOR the second time in ten months Imperial Chemical Industries Ltd. has made substantial cuts in its polythene prices. The reductions stretch from 14-18% — 3d.-4d. a lb. depending on the grade — and became effective on Tuesday (August 1). The price is now 1s. 6d.-1s. 7d. a lb.

Other low density polythene suppliers are expected to follow suit, and Monsanto Chemicals has already done so.

Five Times in Three Years

Last November I.C.I. notched the price down 4d. to 1s. 10d. a lb. In the last three years the price has been reduced five times by about 45% all told. This has been due to increasing efficiency by producers — but also to increasing capacity and competition. In fact I.C.I. stated on Tuesday that 'these new prices which, grade for grade, are equivalent to those of any overseas producer, will enable British converters to meet competition from importations of low-priced goods'.

Monsanto followed I.C.I. with a cut in its virgin polythene of 3d. a lb., and a reduction in its moulding grades of 4d. a lb. Shell Chemical is expected to follow suit.

Most low density polythene is injection moulded, but 30% is used in packaging and I.C.I. is probably expecting the cut to lead to a substantial increase of consumption in this field. A pointer to this is the company's concurrent announcement of a tie-up with packaging specialists E. S. and A. Robinson (see page 204).

●In 1959 world production capacity of low-density polythene was 700,000 tons, and consumption 630,000 tons. I.C.I. is the UK's biggest producer with a capacity in excess of 105,000 tons.

SRT 11

THE latest issue of *Soviet Rubber Technology*, a cover-to-cover translation of the Russian journal *Kauchuk i Rezina*, published this week, contains an article on the properties of ethylene-propylene copolymers.

This compares the properties of a copolymer produced in Russia with those of Montecatini C-23, natural rubber and SBR, in stocks containing carbon black.

This issue (No. 11) also contains articles on the production of synthetic latices; the plasticization of natural rubber in the presence of certain mercaptans, their zinc salts and sulphides; the effect of scorching on the properties of vulcanizates; and a study of the structural and mechanical properties of latices during gelling. There is also an article on the mechanical rubber goods industry of the German Democratic Republic.

Soviet Rubber Technology is produced with the support of the Department of Scientific and Industrial Research, and in collaboration with Maclaren and Sons Ltd. (publishers of RUBBER AND PLASTICS WEEKLY) by the Rubber and Plastics Research Association of Great Britain, Shawbury, Shrewsbury.

Modifying Vinyl

A vinyl plastics resin, Pliovic M-70X, has been developed specifically as a modifying material for plastisol moulding and coating compounds by the chemical division of Goodyear Tyre and Rubber.

The new resin is designed to lower the viscosity of liquid plastics moulding compounds within practical processing limits.

Compounds made with the new resin are claimed to have better flow characteristics and improved stability.

The resin's relatively small particle size is said to allow excellent latitude in compounding without settling from the plastisol paste, and increased adaptability of the resin in coating compounds which must pass through a fixed clearance in processing equipment.

£2m. Plant for Shell Organic Acids

A NEW group of synthetic organic acids of importance to the rubber and plastics industries are to be produced by Shell. Fields of interest include emulsifiers for rubber and plastics, and plasticizers.

Developed after extensive research by the Shell laboratories in Amsterdam, the acids are now available from a pilot-plant, and production on a commercial scale will start next January at a £2m. plant at Pernis, Rotterdam.

The acids are being marketed under the trade name Versatic. They are made from olefins, carbon monoxide and water by a process developed from the original work of Dr H. Koch, of the Max Planck Institutfuer Kohlenforschung, at Muelheim, in the Ruhr area of Germany.

It is expected that eventually a full range of the acids will be made available: the present samples, however, and the acids in full production in 1962, are a blend of C_9, C_{10} and C_{11} mono carboxylic acids.

Fully Saturated

The acids are fully saturated and highly substituted on the carbon atom adjacent to the carboxylic group — there are no acids present having two alpha hydrogen atoms, and only 10% contain one alpha hydrogen atom; some cyclic material occurs among the remaining 90% of the product which has no alpha hydrogen atom. The value of this high degree of branching in the structure of Versatic acids lies in the great stability against hydrolysis of the esters which can be made from them.

Such esters are of interest as plasticizers, while resins based on the acids are expected to possess exceptional chemical stability.

The products as marketed, contain 93% acid (the remaining 7% being neutral oil) are colourless and almost odourless.

Research into applications and products derived from these acids is currently being carried out both in Shell laboratories and those of potential customers.

UAM Newcomer

ANOTHER product for the building industry has been announced by Universal Asbestos Manufacturing Co. Ltd. It involves the combination of Foamjoint — expanded butyl rubber — strip and new Hole-Seal plastics washers for the production of gutter joints. The system avoids the use of tarred hemp and mastic, and joints can be made in any weather conditions.

The butyl rubber strip is produced in a standard width of 3in. with a thickness of ⅛in., and in lengths suitable for all types of gutter. The gutters are delivered with the spigots and sockets already coated with a bonding agent and only light pressure is needed to produce a fully bonded joint between sealing strip and gutter — no extra adhesive being necessary.

Joints are completed with bolts and Hole-Seal washers which compress the jointing strip, and are said to be waterproof even when little more than finger tight.

Earlier this year Allied Structural Plastics, a company formed by UAM and Thermoplastics Ltd. to make products specially for the building industry, began production of a range of medium impact pvc pressure pipe.

C. B. Copeman

FURTHER APPRECIATIONS

WE announced with deep regret last week the death of C. B. Copeman, vice-chairman of Maclaren and Sons Ltd., publishers of *RPW*, and a former chairman of the firm for ten years. More appreciations are printed below.

H. J. Stern, the rubber and plastics consultant, and former consultant editor of this journal, writes:

The young man entering industry retains a lasting impression of the outstanding personalities whom he first meets at gatherings such as those of the Institution of the Rubber Industry. 'CB' will always be thus remembered — as one of the big men in every sense, both physically and mentally, but one who was ever ready, in fact anxious, to help those starting their careers in industry. Though dealing with commercial enterprises of considerable magnitude he was the most approachable of men and many whose names have become well known owe much to his advice and encouragement.

His work for the IRI was paralleled by similar activity in other fields. He was instrumental in founding at least one benevolent fund and it was no fault of his that efforts to place a similar scheme for the rubber industry on a firm basis were not successful. Time may show that his ideas were right.

It is sad to think that his genial figure so familiar at national and international gatherings, not only in England but in many other parts of the world, will be seen no more. All who knew C. B. Copeman will remember and think of him as a man young in thought and ways and will find it hard to believe that he had passed the age of 70.

Herbert Rogers, FIRI, vice-president of the Institution of the Rubber Industry and member of the council of the Federation of British Rubber and Allied Manufacturers, writes:

The sudden passing of C. B. Copeman is very grievous news to me and will be sad news to his innumerable friends throughout the rubber and allied industries.

I first met him over 40 years ago in the days of Walter Maclaren's editorship of the *India-Rubber Journal* when we were all young enthusiasts and he was taking over the mantle of Herbert Standring in convincing the directors of rubber manufacturers of the advantages of advertising in the *IRJ*.

He became one of the original members of the first Council of the Institution of the Rubber Industry and acted as Assistant Hon. Secretary with myself as Hon. Secretary, when the secretariat was in difficulties. It was his suggestion that led to the appointment of the late W. F. V. Cox to the secretaryship of the IRI.

The industry owes him a debt of gratitude for helping to lay many of the foundation stones of the IRI.

'CB' was a very good linguist and travelled extensively, being well known to and having many friends among the rubber industrialists all over Europe.

I have very happy memories of his company at conferences in France and Germany along with my old friends the late B. D. Porritt and Dr Sam Pickles. I knew his delightful and happy family and appreciate how upset he was by the death of his beloved wife in 1960.

He will long be remembered by all who had the good fortune to enjoy his friendship.

Frederick T. Brandon, who was editor of this journal for 15 years prior to his retirement in 1957, writes:

Not many days after I first set eyes upon C. B. Copeman, when I joined the editorial staff of Maclaren and Sons Ltd. in March 1919, 'Mr Bert' — for that was how he was known in the office in those days — disappeared to Manchester on a business trip, and not so very long after that he went on a similar trip to the Continent. The whole of his business life was devoted to the commercial side of the company's business and a good part of every year (except when travel was restricted during the 1939-45 war) was spent 'travelling', in its strictly commercial sense, on behalf of the various Maclaren publications, although occasionally he took a holiday — which again usually meant a trip abroad.

It could be said that he chose the life and he never tired of the many long and protracted journeys he undertook. He tackled his missions with much zeal, made regular, detailed reports to fellow directors and others in executive positions while he was away and had the satisfaction that his journeys proved rewarding as far as the publications were concerned. He made a host of staunch personal friends abroad.

An interest in the rubber industry was implanted in him when he was young and it was not surprising, therefore, that he became particularly concerned with RUBBER AND PLASTICS WEEKLY when it was *The India-Rubber Journal*, a comparatively young weekly only about 36 years old. In a quiet way he was a most loyal member and committeeman of the Institution of the Rubber Industry, which rewarded his long and devoted service with the Hancock Medal.

Years ago the description 'Mr Bert' gave way to CBC, which pin-pointed him among the several members of the family who became actively engaged in the business and as CBC he became extremely well known in the rubber industry. By nature a kind, cheerful, approachable man, he inspired a wonderful enthusiasm among the people nearest to him in the business and, as chairman of Maclaren and Sons Ltd., did much to maintain the family spirit which was evident in the business when I joined it and which always showed itself in all directions during my active association with it. There we were: a big bunch of friends and CBC, the chief in later years, was 'tops' among us.

Silicone Fabric Finish from Celanese

British Celanese is introducing a silicone finish for Tricel triple blend fabrics which has been developed to give the fabrics considerably improved properties.

This will, it is claimed, give an improved handle and greater resistance to creasing and water repellency, none of which are lost in washing or dry cleaning. Within the next 18 months approval of the standard of finish currently obtained without the use of silicone will be withdrawn and only fabrics incorporating the new silicone finish will be approved under the Tricel labelling scheme.

PI News

City of London College Lectures

THE Plastics Institute is again arranging a series of lectures on plastics to be held at the City of London College, Moorgate, in the autumn. The lectures are of an introductory nature and are intended for non-technical staff. Applications for registration forms should be sent to the City of London College as soon as possible. The programme is as follows: October 2, Types of Plastics, by C. A. Redfarn; October 9, Plastics and the Chemical Industry, by E. S. Narracott; October 16, The Structure of the Plastics Industry, by C. J. G. Stanley; October 23, Plastics as Replacement Materials, by K. B. Bartlett; October 30, Creation of New Markets by Plastics Materials, by C. W. Welch; November 6, Plastics and Packaging, by G. Swift; November 13, The Plastics Industry and the Rubber Industry, by J. A. Rhys; November 30, The Future, by V. E. Yarsley.

News from South Africa

Tyre Demand Improves

BUT GENERAL RUBBER OUTPUT IS LOWER

THERE has been some improvement in the demand for tyres this year and this trend is expected to remain steady for several months to come, so that the leading factories have arranged production schedules to keep pace with the expected demand. According to a recently-released industrial census report some 27 establishments in South Africa were engaged in the manufacture of rubber products in 1958-59. A total of 4,010 workers were employed and they enjoyed a wage bill of £1.4m. The net value of output was £2.9m., compared with £3.1m. in 1957-58.

Preparations for Smoked Sheet

A factory at the Vizara rubber estate in Nyasaland near Nkata Bay is to be modernized at a cost of about £12,000 in order to boost output to 200 tons of rubber annually. At present only crepe rubber is produced at the factory, but plans are understood to be in hand for the early production of smoked-sheet rubber.

The Masculine Trend

African Explosives and Chemical Industries Ltd., reports that its vinyl leathercloth section is producing a new fabric — Oxford — which has a tweedy appearance 'designed to match the new masculine trend in interior decoration'. Currently there is a choice of eight muted shades that will tone in with any contemporary decorative scheme. This material is being made primarily for use by the upholstery industry, but it has also been suggested as suitable for combining with mural work, as it possesses the utility of a plastics finish with a texturized appearance.

The Plastics Institute Goes Down the River

The Plastics Institute President's reception and conversazione took place on July 25 and the programme included a trip down the river to Greenwich and a visit to the National Maritime Museum. Pictured here are: 1. Commander W. E. May (Deputy Director of the Museum), with Sir Laurence Merriam (the new President of the Institute) and Lady Marjory Merriam. 2. V. H. Wentworth (Monsanto) and Mrs Wentworth and Dr F. H. Cotton (NCRT). 3. T. L. Birrell (Yarsley Laboratories) and Mrs Birrell, R. Maitland (BX Plastics) and Mrs Maitland. 4. P. Smith, C. E. Tofts, A. W. Sherwood and H. H. Lusty (Bakelite). 5. Mr and Mrs J. L. Fergus with a Telcon Plastics party. 6. L. M. Read (new Chairman of Council) and Mrs Read. 7. D. Revington (Nettle Accessories), Mr and Mrs J. Evans and Mr and Mrs J. A. Mackie. 8. Mr and Mrs Dyer, Dr C. L. Child (I.C.I.) and Mrs Child. 9. E. C. W. Huson (I.C.I.) and Mrs Huson, Mr and Mrs. D. G. Davenport

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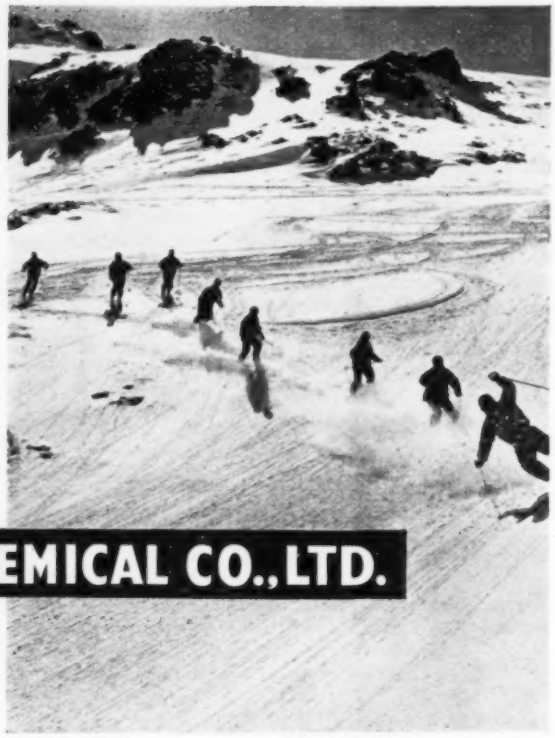

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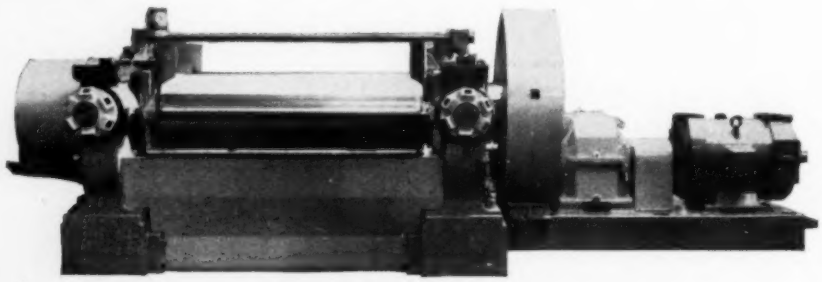

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MEN *and* MATTERS

A Review of People and Events

by Peter Richards

AN ingenious apparatus, which has a touch of 'Emergency Ward 10' about it, has been developed by Dunlop's general rubber goods division. This is for operations which need hypothermia (the 'deep freeze' treatment).

Up to now the patient has been lifted in and out of a bath to achieve the necessary lowered body temperature — a difficult, clumsy process. The new method involves playing jets of water on the patient.

The apparatus consists of a length of waterproof material which is laid over the operating table. Two side pieces, to which are attached lengths of perforated copper tubing, are raised to form a trough. Along the bottom, and running the full length of the table, are laid 12 rubber tubes, each beginning and ending in a manifold (inlet and outlet), and covered with a second, removable, waterproof sheet. On this the anaesthetized patient is placed, and cold water is circulated through the rubber tubes. At the same time ice water from a tank is pumped through the copper tubes at the top of the trough, and falls in a spray onto the neck, trunk and legs of the patient.

The equipment was recently used very successfully in an operation on a 17-year-old girl with a hole in her heart.

Change at the Top

Owing to his assumption of important new duties within the Pirelli Group — including those of representing Société Internationale Pirelli in the UK — G. Baricalla has resigned as managing director of Pirelli Ltd. He has been elected vice-chairman of the company.

Mr Baricalla joined Pirelli Ltd. in 1948 and was appointed managing director in 1949. G. Venosta, who was appointed general manager in May 1957, has been appointed managing director.

British Workmen in Baghdad

Not only executives have trips abroad. In September two British workmen will fly out to Baghdad to lay 1,000 sq. yd. of specially-made anti-static flooring in a new ordnance factory being built for the Government of Iraq. They are W. Ward, of Kensington, and H. W. Francis of Ilford, Essex.

The flooring — Phengard — is made by the Phoenix Rubber Co. Ltd., of Slough, Bucks. Its anti-static properties lie in the fact that minute particles of carbon black are evenly distributed throughout the 'mix'. These particles collect any static electricity that may exist and conduct it to a 2in. strip of brass foil laid under the flooring. The brass foil, in turn, channels the dangerous static harmlessly to earth and thus eliminates the possibility of explosion.

Blythe Colour Works

I regret to record the death of W. E. Charles, who was with Blythe Colour Works Ltd. for over 30 years. He was in charge of administration in the Blythe laboratories.

Blythe has appointed two of its departmental managers, W. V. Hedges and E. H. Leadbeater, directors of the company. Both have been with the firm for 30 years, joining it from school.

Pouring Houses

People who make the prediction about the 'all-plastics' houses that we will shortly be living in probably do the industry more harm than good. This is generally the sort of talk that fosters wrong application. There are limits, both technical and economic, but looking ahead 20 years is perhaps safe enough. . . .

By the 1980s whole houses in USA will be constructed of plastics, predicts Charles Ludlow, of Allied Chemical's international division.

He cites an experimental building constructed by US Army engineers at Fort Belvoir, Virginia, as a practical example of 'one of the most significant advancements in plastics thus far'.

The building, about the size of a two-car garage, was constructed of panels, moulded and shaped from foam sprayed from a 55-gallon barrel. It was reinforced by spraying it with polyester and when completed weighed about 550lb. — less than half as much as a small car.

'There will come a day when houses such as this will be poured from a barrel', Ludlow says. 'Buyers will select a site and then order barrels of chemicals for on-the-spot moulding into the panels that will be used in the basic structures of the houses'.

So in the future perhaps when we are moving we will ask our friends round and say: 'I'll pour you a drink — when I've poured the house'.

Two years Hard in the Library

Library chairs receive more 'hard sitting' than most, and replacement bills can be high. So two years ago the commercial section of Manchester Central Library decided to test the wearing virtues of plastics, and bought 54 chairs upholstered in a fabric based on polyvinylidenechloride monofilament. Some of the chairs are pictured (over); they were made by Ernest

BIP Beetle polyester resins and glass fibre are used to produce the graceful lines of the Kencat powered catamaran. Built by the Kenmar Co., Birmingham, the 8ft. craft weighs only 75lb., is easily transported on the smallest car and costs £97

Race Ltd. and the fabric was woven by Fothergill and Harvey.

Since they were installed 800 people a day have sat and shifted

about in the chairs while they searched for (or wrestled with) facts and figures; but they show no sign of wear and no replacements have had to be made.

GRP Water Tortoise

I have heard of fibre glass boats in plenty, but never until recently of a fibre glass kayak. The kayak was made from Turners Duraglas fibre by K. G. Robinson, a divisional education officer in North Borneo.

Called *Kurakura* (water tortoise), it has many unusual features for a boat in Borneo, for it is designed on the kayak principle of an open cockpit which can be protected by canvas covers from rain.

Mr Robinson decided on the design because the conventional Sarawak longboat is not cheap to run — and seems to ship the maximum amount of rain and river water.

In the building of this water-tortoise, about 65lb. of glass material and 160lb. of resin were used; it was so constructed that strength and rigidity was built into the keel and hull bottom section by utilizing seven plies of woven roving — these plies were reduced progressively towards the gunwales until the decking section served only as a protective covering against rain.

Appointments in Brief

Arthur Wilson (31) has been appointed chief technologist to the Vitafoam group of companies. Mr Wilson, who has been with the concern for four years, was formerly technologist in charge of latex foam production.

* * *

H. F. Judd, AIEE, has been appointed Managing Director of Ioco Ltd. as from August 1, in succession to J. A. Killick who has taken up another position within the Vickers Group.

* * *

British Insulated Callender's Cables Ltd. has appointed J. Large, winding wires divisional manager, as general manager, winding wires division.

* * *

C. B. McKeown, general manager of B. F. Goodrich Aviation Products, has been appointed general manager of the newly-formed Aerospace and Defense Products division of the company.

* * *

B. H. Oldfield, Director and Engineering Manager of Laporte Chemicals Ltd., is to retire in September. He will be succeeded as Engineering Manager by Dr Maurice Ruddick.

* * *

Edwin H. Beaumont, sales director of Evode Ltd., of Stafford, has been appointed to the board of Evomastics Ltd., an associate company.

Polly Ester Says...

'Fumarate? — same, but I've gone on to tipped'

THE LEGAL ANGLE

Testing Sales

By a Barrister

'Mr Paul Chambers, the Chairman of I.C.I., told shareholders that sales so far in 1961 are "about equal" in volume to those of a similar period a years ago'.—RPW, May 27 1961.

I suppose there are many companies which would be happy enough to keep sales steady — but most look for an increase. And as often as not, an increase comes from the initiative, energy and hard work of commercial representatives. Good reps. equal good profits — and satisfied reps. work well. But, like all good things, good reps. go; and questions often arise about their pay.

Take, for instance, the traveller employed by a plastics company who gave in his notice and left for — he hoped — greener pastures. He was given his pay to date, including both salary and commission. But when he asked for commission on repeat orders which came in after he had left the business, he was politely refused.

'Our arrangement was that I was to have commission not only on initial orders', he protested, 'but also on repeats'.

'True enough', replied the company, 'but this was clearly only during the continuance of your employment'.

The result? Both went to see their lawyers — and were told the same.

There was a case not long ago on just these facts, and the Court held, as usual, that whether or not the representative was justified in his claim depended entirely upon the terms of his contract of service. If there was express provision that he was to be paid on repeats, even after he had left the firm, then he could demand such commission. But, the Court went on, if there was no express term in the contract to that effect, it was most unlikely that such a term would be implied. In other words, as the representative's contract of service was silent about what was to happen, he was in the wrong.

Let us put it differently. The Court will only imply terms into contracts if they are absolutely essential to give business efficacy to those contracts. And they will not imply a term into the contracts of employment of commercial travellers that they are to be paid commission after their employment ceases.

The moral? If you are a traveller — assuming that you think it reasonable and necessary — you should make certain that a term is included in your contract of service that you are to be paid commission on all repeat orders, both during and after the termination of the contract of service. And if you are the employer, do not worry. If nothing is said about commission on repeats after termination of employment, you will not have to pay any. In this case, at least, that which is unsaid will do you no harm.

RMEA at Buxton

EMPHASIS ON LABOUR RELATIONS

THE Rubber Manufacturing Employers' Association held a very successful course for foremen at Buxton recently. Thirty-seven delegates attended, representing most sections of the industry. P. H. Lee of the North British Rubber Co. Ltd., member of the executive committee of the RMEA, who presided at the first session, opened the proceedings.

This year there was special emphasis on labour relations and the course was therefore considered to be well attuned to the needs of the present time. Among the subjects in the syllabus were 'The Foreman's Job' by R. Edwards, Tyresoles Ltd., 'Labour Relations', which included lectures on 'Consultation between Members of Management', by W. G. Morris, Greengate and Irwell Rubber Co. Ltd., 'The Stages in Negotiating Procedure', given by C. Marks of the Dunlop Rubber Co. Ltd., and 'Communications' by R. A. Sackett of BTR Industries Ltd.

R. G. Room, Avon India Rubber Co. Ltd., spoke on 'Work Study', P. G. Land, BTR Industries Ltd., gave an excellent paper on 'Budgetary Control', and R. Hillier, H.M. Superintending Inspector of Factories, dealt with the subject of Industrial Law.

The subject of 'Planning' was presented by W. J. Barton, Dunlop Rubber Co. Ltd., and S. F. Smith, also of the Dunlop Rubber Co. Ltd., spoke on 'Accident Prevention'.

The course concluded with a paper on 'Quality Control' by M. A. Simmons of the Goodyear Tyre and Rubber Co. Ltd.

T. H. Redfern, vice-chairman of the RMEA, presided at the final session.

The friendly atmosphere of the course is shown in the picture: (*back row, left to right*): J. Eastwood (Fleming, Birkby and Goodall Ltd.), A. Wainwright (Goodyear Tyre and Rubber Co. Ltd., Wolverhampton), V. Kinneavy (Fort Dunlop), W. G. Wilson (BTR Industries Ltd.), J. Tuson (BTR Industries Ltd.), W. Whalley (Michelin Tyre Co. Ltd.), T. Redfern (Greengate and Irwell Rubber Co. Ltd.), D. Collier (Silvertown Rubber Co. Ltd.), A. Riley (BTR Industries Ltd.), H. Willoughby (Greengate and Irwell Rubber Co. Ltd.).

Middle row, left to right: A. Donald (Goodyear Tyre and Rubber Co. Ltd., Glasgow), J. Whiteside (Fleming, Birkby and Goodall Ltd.), B. Forsyth (Goodyear Tyre and Rubber Co. Ltd., Glasgow), A. McLeod (Fort Dunlop), H. Probin (Goodyear Tyre and Rubber Co. Ltd., Wolverhampton), N. Appleton (Michelin Tyre Co. Ltd.), G. J. Craddock (Rubber Improvement Ltd.), A. Littler (Michelin Tyre Co. Ltd.) W. Whitney (Silvertown Rubber Co. Ltd.), A. Devitt (Goodyear Tyre and Rubber Co. Ltd., Wolverhampton), H. Fox (Redfern's Rubber Works Ltd.), L. F. Slater (Pirelli Ltd.), N. Woan (BTR Industries Ltd.), C. F. Stimpson (Pirelli Ltd.), T. W. Garner (Leyland and Birmingham Rubber Co. Ltd.). (*Front row, left to right*): W. Kenyon (David Moseley and Sons Ltd.), (*standing*), J. Ashford and E. Gray (Capon Heaton and Co. Ltd.), G. T. Hulmston (assistant to the secretary of the RMEA), M. A. Simmons (manager — quality control, Goodyear Tyre and Rubber Co. Ltd.), T. H. Redfern (vice-chairman, RMEA), A. Babbage (secretary, RMEA), G. Street, R. D. Avery and T. Bound (Avon India Rubber Co. Ltd.).

Light Oils 10%

Light hydrocarbon oils have suffered under the Chancellor of the Exchequer's new economic measures.

Norman Campbell, chairman of the Industrial Light Oils Committee, representing 13 national trade organizations, commenting on the 10% increase in the duty on light hydrocarbon oils has said: 'This will raise the cost of production of a wide variety of products including rubber and plastics. . . . The industrial oils used in their processes are subject to the same rate of duty as motor fuel. The export trade of the industries concerned will also be adversely affected'.

Power Press Agency for P and S

P and S, The Press and Shear Machinery Co. Ltd., 172-178 Victoria Road, Acton, W.3, has been appointed exclusive UK distributor for the double crank power presses manufactured by Hubert-Juy-Legros, 97 Avenue du Général Michel Bizot, Paris 12.

The main structure of this bridge at Harlow New Town consists of two laminated beams 66ft. long, cantilevered over splayed laminated supports. The timber was glued with Ciba Aerodux 185 resorcinol resin

BOOK REVIEWS

Injection Moulding and Vacuum Forming

'Grundzüge der Spritzgusstechnik' by Walter Mink. DM14.80. 'Vakuum-Formung von Thermoplastischen Kunstoff-Folien', by W. Neitzert. DM12.80. Both published by Rudolf Zechner.

THESE two German books (not translations) are respectively volumes 2 and 3 of *Die Kunstoff-bücherei* — The Plastics Library — and they have several attractive features. They are written by experts and collect in one place the latest information in their respective fields. They are practical, cheap, well-printed, slim books, with flexible covers permitting them to slip easily into the pocket or to take their places on the library shelf.

Although Walter Mink says in his preface to the book on the fundamentals of injection moulding that he does not claim completeness, he obviously goes as far as 200 pages will allow, having 93 illustrations and 24 supplementary sketches. From his practical experience over many years in the industry, he includes a general description of the basic processes, and also detailed techniques, machines, moulds, materials, and designs.

In the same way, the book on vacuum forming from thermoplastic sheet is written for the practical man, and is also rich in photographs, sketches, and diagrams. Most of the book is taken up by seven chapters on the appropriate techniques for the different sheet materials, pvc, polystyrene, polythene, polypropylene, polycarbonates, and cellulose acetate.

Both of the books are detailed treatises for the expert, and especially for the design technologist. They ought to be available for reference in every plastics library. At little more than £1 each, they are excellent value.—F.C.J.

Rubber Technology

Annual Report on the Progress of Rubber Technology. Vol. XXIV. 1960. 165*pp.* + *vii.* Non-members 25*s.* *Members* 12*s.* 6*d.* *Pub. by W. Heffer and Sons for the Institution of the Rubber Industry.*

THIS year, it is almost 'the mixture as before', and a good mixture it is. With two sections less this time (foreword and surgical goods) it has nevertheless 17 more pages distributed over its 24 chapters, which range from statistics, through theoretical science and technology, to the manifold applications of rubber today.

It is an indispensable book for the student but quite interesting simply to read — or at least to browse in — because the editorial policy is to encourage the individual writers of the sections to make a personal choice of items and to comment critically and freely. This results, together with the economy in words enforced by a report of this kind, in bright, clear, incisive statements. It also means that there is occasionally a quite valuable overlapping.

Many are surprised to find how little, both new and significant, happens in 12 months, and try to make a case for a three- or five- or ten-year period, during which, it is hoped, a trend would become sufficiently established to be able to assess its significance. History, not a report, would result.

A year is admittedly an arbitrary period, but the aim of this yearly document is to provide something more than simply a history of progress; it aims also at stimulating further progress and even at recording the results of bows drawn at ventures though the targets be missed.

There is no doubt that, for news, the more frequently a periodical appears the better but, for reviews, of what was once news, something between frequently and rarely is wanted. It might be suggested to the IRI to incorporate in it, say every five years, an assessment of trends in particular fields.

Providing it continues to appear as soon as ever possible after the end of the year, it is a valuable document which should be read by every professional man in the industry who takes his work seriously.—F. C. J.

Cascelloid, of Leicester, has introduced this 10-gal. rectangular blown bottle in high- or low-density polythene. It incorporates strengthening ribs in front, back and side surfaces. Longitudinal ribs on the base minimize any tendency to roll. The overall dimensions are: height, 32½in.; width, 15in.; and depth, 11in.

British Standards

BS 2899: Part 2
Silicone Rubber Insulation

BS 2899 deals with rubber insulation and sheath of electric cables. Part 1, issued in 1958 deals with insulation and sheath made of natural rubber, styrene butadiene rubber and polychloroprene., Part 3, to be published soon, will give requirements for butyl rubber insulation and sheath.

This second part of the standard has been prepared, at the request of the cable manufacturing industry, to give performance requirements for the silicone rubber insulation which is being increasingly used commercially in fixed and flexible cables and cords intended for use at conductor temperatures of the order of 150°C. Composition, physical and electrical requirements and tests are given.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 3s. each.

BS 1774:1961
Revised Standard for Plastic Rainwear

BS 1774:1961 is a revised British Standard for rainwear made from unsupported pvc sheeting. The revised standard provides a specification for the pvc sheeting especially produced for rainwear as well as for garments made from it. The earlier edition of BS 1774 was published ten years ago when specific requirements for sheeting for rainwear application had not been evolved and fabricating techniques were in their infancy.

The revised standard lays down requirements for sheeting which will give satisfactory wear and for the strength of seams, particular attention being paid to those areas in the garment where the stress is greatest.

Because the development of thin-gauge pvc sheeting has found satisfactory application in the rainwear trade, no minimum limit of thickness is laid down in this specification; adequate strength is assured by the subjection of the material to a tear strength test simulating service conditions.

A test is included to ensure that the completed garment has seams of adequate strength. The standard recommends that information on the nature, properties and care of rainwear fabricated from pvc should be made available to purchasers.

Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 8s. 6d.

Calls for Tenders

Tyres and Tubes

Tyres and tubes of various sizes are requested by Central Purchasing Authority, P.O. Box H-5 Saigon, to whom bids should be sent, quoting Invitation No. 0202-29061. Closing date: August 9 1961. (Ref. ESB/23095/61.)

Plantation Newsletter

SHIRT SLEEVES FOR PLANTERS' CONFERENCE

by our Malayan Correspondent

FROM KUALA LUMPUR

FROM every State in Malaya, 140 rubber planters gathered in Kuala Lumpur at the Rubber Research Institute to attend the first planters' conference for 23 years. It was a most informal get-together with as little ceremony as possible and shirt-sleeves the order of the day.

Many more than the 140 planters who were accepted did apply to take part, but this number was considered the limit. In fact, 140 was considered by some to be more than enough.

The planters were drawn from a cross-section of the planting community (estates and smallholdings) and faced a 'brains trust' of 12 RRI scientists who spoke on behalf of the Institute. Mr F. W. Hutchison, head of the Estates Advisory Service of the RRI, who organized the conference, presided at the opening session, and Dr C. C. Webster, director of the RRI, spoke.

On the first day three papers were read on tapping and yield stimulation. One was by P. W. Shearlaw, of Harrisons and Crosfield (Malaya) Ltd., on 'Survey of Commercial Yields in Relation to Tapping Systems'; a second by Mr Chan Jan Jee, of Lee Plantations Ltd., on 'Tapping Systems and Yield Stimulations on Three Estates'; and a third by P. de Jonge, RRI, on the 'Tapping of Young Rubber'.

Then came an open discussion on three subjects selected by the planters participating in the conference. They were on 'Weed Control and Herbicides', introduced by Dr G. A. Watson, head of the soils division of the RRI; 'Cover Plants, Manuring and Wind Damage', also introduced by Dr Watson; and 'Root Disease Control', introduced by Dr A. Newsam, head of the pathological division of the RRI.

Many of the planters put forward their own problems on these subjects and a great deal of cross-fire ensued during which the experts of the RRI answered many queries.

The following day — it was only a two-day conference — the planters were taken out to the RRI experimental station at Sungei Buloh, 18 miles from Kuala Lumpur to see some of the practical experiments being carried out.

The Coming Thing

They saw new factory and smokehouse techniques, methods of manufacture of new types of rubbers, and mist propagation, which is considered one of the most promising methods of propagation of high-yielding materials. Mist propagation is a method by which it is hoped to cut down the time of maturity of rubber trees.

This new type of propagation is considered by many experts to be 'quite the coming thing', but it will take a few more years to learn all about growth characteristics of trees grown by this method before it can be recommended for general usage.

The planters also saw a demonstration of spraying and dusting machinery, weed control experiments were explained, and they were briefed in the progress made so far in the study of joining together clones with dissimilar growth characteristics, a field of research on which not a great deal is so far known.

Papers and discussions resulting from this conference will be published in September and there appears to be little doubt that this get-togeher will now become an annual affair.

The last time a planters' conference was held in Kuala Lumpur was in 1938, but with the intervention of the last world war and then the ten years of Emergency in Malaya, it was not repeated until now. What must have struck everyone attending the conference was that the strides made in the production of natural rubber in those 23 years have been little short of staggering.

Crisis Repercussions

Thomas E. Shea, vice-president of a New York firm, Jacobus F. Frank and Co., which deals with rubber and other Far Eastern exports, said in Singapore that there was little possibility of synthetic rubber replacing or competing strongly with natural.

'There is hardly any chance of synthetic overtaking natural, in spite of recent increased production of the former', he said. 'I don't think the production of synthetic rubber will be sufficiently great to prove a dangerous threat or rival to the natural rubber trade', said Mr Shea.

However, he admitted that the rubber market at present was 'edgy' because of the unstable world political situation. Crises in Berlin, Laos and Kuwait would have serious repercussions on the world rubber market.

'No one knows what is going to happen next in the rubber market. At one moment it may be stable, while the next moment it may fluctuate violently', he added.

Mr Shea has now left for Djakarta, Indonesia.

Rubber Statistics

UNITED KINGDOM — JAPAN — NIGERIA

IMPORTS of all rubber into the UK during June amounted to 24,052 tons, according to figures issued by the Board of Trade. Exports totalled 5,908 tons. Detailed figures are given:

IMPORTS

	June 1961	June 1960
Nigeria	1,231	1,980
Singapore	4,943	4,654
Federation of Malaya	8,388	11,204
Ceylon	673	425
British North Borneo	378	204
Canada	1,909	2,067
Other Commonwealth Countries and Irish Republic	311	83
Vietnam	1,275	142
Indonesia	781	1,938
USA	902	2,408
Other foreign countries	3,261	1,310
Total	24,052	26,415
Rubber latex	2,958	2,324
Other raw, including crepe	17,209	18,374
Balata	52	22
Synthetic rubber	2,900	4,082
Others	933	1,255
Total	24,052	26,415

EXPORTS

Commonwealth countries and Irish Republic	1,484	1,379
West Germany	311	299
Spain	724	748
Netherlands	258	151
Other foreign countries	3,131	3,401
Total	5,908	5,978
Synthetic and reclaimed rubber	2,578	3,390
Waste rubber	3,330	2,588
Total	5,908	5,978

Japan

The Japanese Rubber Importers' Association announces that the consumption of crude rubber in June totalled 13,000 tons, unchanged from May. The domestic consumption of crude rubber in July, it is estimated, will be 12,500 tons.

The end-June stocks of crude rubber were 17,510 tons, compared with 19,010 tons in May.

The Japanese Customs House announces Japan's crude rubber imports during June amounted to 11,500 tons, compared with 16,710 tons in May. The July import of crude rubber so far is 11,000 tons.

Nigeria

Nigerian rubber exports in March 1961 reached 2,820 tons against 3,105 tons in March 1960. The UK was again the largest importer with 891 tons (1,464 tons in March 1960), followed by West Germany with 615 (713 tons). Czechoslovakia was third with 245 tons (235).

Crepe exports in March totalled 1,536 tons against 2,541 tons in March 1960. The USA was the largest buyer with 895 tons (1,729) followed by the UK with 310 tons (722).

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

SIR John Hambury-Williams, head of COURTAULDS, told a shareholders' meeting recently that the group's trading profits for the first three months of the current year were less than the same 1960 period, the best quarter of last year. The remaining nine months of the year should show some improvement over 1960, although the widespread uncertainty of the present economic situation must increase the difficulty of maintaining profits at last year's level. Shareholders were told that the directors would be in a better position to forecast results for the full trading period when the half-yearly profit figures were announced early in November.

Sir John proudly reported that the company had export traditions stretching back over 100 years. However, its record during the past three years had been striking. Exports of the group rose from £14m. in 1959 to £21m. in 1960, and rose a further 25% to a £26m. peak last year. The figures were the more impressive in that they had been achieved at a time of increased competition abroad and rising costs at home. He regretted that Courtaulds (Australia) had not been as successful as the board and the Australian shareholders anticipated. But Australia was a high-cost country and the Australian associated company was suffering from 'insufficient protection against low cost imports'.

Before Mr Lloyd, the Chancellor of the Exchequer, had appealed for restraint, the directors of DISTILLERS announced that having reviewed prospects for the current year it had been decided to declare a 6% interim dividend in December. This is at the same rate as paid on account of the year ended March 31 1961, but on the higher capital. Total value of the group's turnover rose by 13% to £263m., while group trading profits after depreciation rose from £30.4m. to £32.1m.

Trading results, reported Sir Graham Hayman, the chairman, created a new record, and it was the Scotch whisky and gin companies which accounted entirely for the increased profit. Their proportion of the total is at present running at a level of 82% with the industrial group accounting for the balance. Referring to the industrial group, it was revealed that there was a satisfactory increase last year, especially in chemicals and plastics. But like many others in the same field in the latter part of the year the companies had to face lower selling prices which reduced profit margins. Competition was keen and was aggra-

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Share Price Movements

Par Value	Company	1961 High	Low	July 22	Latest
£1	A.E. Ind. Ord.	48/6	35/6	36/6	35/9
5/-	Albright & W. Ord.	29/6	22/6	23/-	23/-
£1	„ „ „ 5% Pref.	17/3	13/-	14/-	13/-
5/-	Anchor Chemical Ord.	25/6	16/-	21/6	18/9
4/-	Airfix	53/-	34/6	52/6	51/6
4/-	„ Non Voting	51/3	33/6	51/-	49/6
5/-	Andersons Rub. Ord.	—	—	3/9	3/9
£1	Angus Geo. Ord.	83/-	58/6	70/-	64/6
5/-	Ault & Wiborg Ord.	17/-	12/9	28/9	13/9xc
£1	Avon India Rubber Ord.	46/6	30/-	37/6	37/6
£1	„ „ „ 6% Pref.	19/3	17/6	17/6	17/6
10/-	Bakelite Ord.	66/3	42/3	48/9	46/3
£1	„ 6% Pref.	19/3	16/6	17/6	17/6
£1	Baker Perkins Ord.	59/6	40/6	48/9	48/-
4/-	Bank Bdg. Rubber Ord.	3/6	1/9	2/3	2/3
4/-	Bettix	11/9	7/6	9/6	9/6
4/-	Brammer H. Ord.	17/-	15/-	15/6	15/-
10/-	Bridge, David Ord.	60/-	30/-	33/6	30/-
5/-	Bright, John Ord.	9/6	7/-	7/9	7/3
5/-	Brit. Blting & Asb. Ord.	24/-	17/6	21/6	20/9
£1	„ „ „ „ Pref.	—	—	13/3	13/3
5/-	British Electronic Indus.	15/6	9/9	10/6	9/9
2/-	B. I. Plas. 10% Pref.	9/9	4/3	9/9	9/9
£1	BICC Ord.	62/6	50/3	56/3	55/3
5/-	BTR Ind. Ord.	19/9	10/6	11/-	11/-
£1	„ „ 7½% Pref.	21/6	20/-	20/-	20/-
10/-	Castrol Ord.	52/-	37/-	39/3	38/9
£1	Courtaulds Ord.	47/6	34/6	36/-	37/-
£1	„ 5% 1st Pref.	16/-	14/-	14/3	14/-
£1	„ 6% 2nd Pref.	18/3	15/9	16/-	15/9
4/-	Cow, P. B. Ord.	10/6	7/6	9/3	9/3
£1	„ „ 5% Pref.	14/3	13/3	13/6	13/6
1/-	Dannimac Mfg. Ord.	15/3	11/3	12/-	11/6
10/-	De La Rue Ord.	70/-	51/9	54/-	52/6
£1	„ „ „ 3½% Pref.	10/6	9/6	10/-	10/6
10/-	Distillers Co. Ord.	41/3	31/-	33/6xc	33/3
£1	„ „ 6% Pref.	20/3	17/6	17/6	17/6
£100	„ 5% Conv. Loan	£96	£90	£91½	£91½
£100	„ 5½% Unsec. Loan	£86½	£75	£76½	£76½
10/-	Dunlop Rubber Ord.	29/-	21/6	26/-	24/6
£1	„ „ 5½% Pref.	16/-	13/9	14/-	14/-
£100	„ 3½% 1st Debs.	£69	£67	£67½	£68
£100	„ 4½% 2nd Debs.	£79	£76	£78	£78
£1	Eng. Elect. Ord.	40/6	30/6	30/-	30/9
4/-	Ebonite Cont. Ord.	8/6	6/-	6/6	6/6
£1	English China Clays Ord.	117/6	80/-	94/-	89/3
£1	Goodyear Tyre 4% Pref.	11/6	9/9	10 3/4	10/-
5/-	Greeff Chem. Ord.	37/6	22/9	29/3	28/-
10/-	Greeff Chem. 5½% Pref.	8/3	7/-	7/-	7/-
4/-	Greengate & Irwell Ord.	6/9	5/-	5/3	5/-

Par Value	Company	1961 High	Low	July 22	Latest
5/-	Hackbridge Hldg.	6/9	4/9	4/9	5/3
£1	Harrisons & Crosfield Dd.	57/6	47/6	49/-	49/-
1/-	Hunt & Moscrop Ord.	2/3	1/3	2/-	1/9
£1	Imp. Chem. Ord.	81/6	63/-	65/9	68/3
£1	„ „ 5% Pref.	16/3	13/6	14/-	14/3
£100	„ 4¼% Unsec. Loan	£83	£76¾	£78	£78
£100	„ 5¼% Conv. Loan	£93	£86	£86	£86
1/-	Kleemann (O. & M.) Ord.	21/3	8/3	19/-	19/-
£1	„ 6¼% Pref.	22/3	16/3	22/3	22/3
5/-	Laporte Ind. Ord.	30/9	23/3	24/6	23/3
£1	„ „ 7½% Pref.	23/-	21/3	21/3	21/3
£1	Leyland & Birm. Rubber Ord.	59/3	46/3	50/-	50/-
£1	„ „ „ 6% Pref.	18/9	15/-	15/-	16/3
2/-	London Rubber	15/6	9/6	13/3	13/3
£1	„ 6% Red. Cum. Pref.	20/-	16/9	16/9	17/6
£1	McKechnie Bros. Ord.	43/-	27/-	40/-xc	40/-
£1	„ „ 'A' Ord.	45/-	35/-	38/9xc	38/9
£1	„ „ 6% Cum. Pref.	18/-	16/-	16/6	16/6
5/-	Monsanto Chem. Ord.	27/6	20/6	20/6	20/6
£1	„ „ 3½% Pref.	12/6	11/3	11/3	11/3
£100	„ „ 6% Debs.	£98	£89	£89½	£89½
5/-	Miles (H.G.) Hldgs. Ord.	7/9	7/-	7/6	7/6
2/-	Movitex	—	—	5/3	5/3
£1	North British Rubber	21/3	12/-	13/-	12/-
5/-	Northwestern Rubber	13/-	9/-	12/-	12/-
5/-	Plastic Enginrs. Ord.	40/-	28/6	38/9	30/9
10/-	Projectile & Eng. Ord.	50/6	22/6	33/6	31/9
5/-	Redfern Holdings Ord.	3/9	2/9	2/10½	3/-
2/-	RFD Ltd. Ord.	6/3	3/6	4/9	4/9
£1	„ „ 5½% Pref.	15/-	12/6	12/6	12/6
2/-	Rubber Imp. Ord.	6/3	3/3	3/9	3/9
2/-	„ „ 'A' Ord.	5/-	2/6	2/6	3/3
£1	„ „ 5% 1st Pref.	13/3	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	18/3	15/-	17/9	15/-
4/-	Shaw Francis Ord.	24/6	14/-	14/9	13/-
£1	Shell Ord. (Reg.)	140/-	108/-	121/-	122/6
2/-	Silentbloc Ord.	10/6	8/3	9/3	9/3
5/-	Storey Bros.	46/-	34/-	35/3	34/-
2/-	Sussex Rubber Ord.	2 7/8	1/9	1/9	1/9
5/-	Sutcliffe Speak Ord.	18/6	13/-	16/3	13/-
£1	Tootals	35/6	28/-	29/9	29/-
£1	Turner & Newall Ord.	78/-	55/-	61/-	63/6
£1	„ „ „ 7% Pref.	21/6	19/-	19/3	19/3
5/-	Universal Asbestos Ord.	27/-	21/3	23/-	21/3
£1	Venesta Ord.	76/-	61/-	64/9	63/-
5/-	Viscose Dev. Ord.	16/3	13/3	14/9	13/9
5/-	Warne W. (Holdgs.) Ord.	21/6	14/9	20/-	19/-

Rubber Markets

LONDON

Higher Eastern advices and covering against European orders, steadied the market and offset slightly bearish sentiment that derived from the Chancellor's budget proposals. A dull phase ensued, but values again steadied in sympathy with the East, although buying interest was small and selective. Factory holidays restricted activity.

Latest prices are as follows:

No. 1 RSS Spot: 24½d.-24¾d.

Settlement House:

September 24⅝d.-24⅞d.

October 24¾d.-25d.

November 25d.-25¼d.

October/December 25d.-25¼d.

January/March 25⅛d.-25⅜d.

April/June 25⅛d.-25⅜d.

July/September 25⅛d.-25⅜d.

No. 1 RSS cif basis ports:

August 24¾d.-24¾d.

September 24¾d.-24¾d.

October 25⅛d.-24¾d.

Godown:

August 82 Straits cents.

Latex

Centrifuged 60% latex per gallon in drums, seller, September, October, 14s. 5d., cif European ports. Spot, seller 14s. 10d. Bulk, seller d.w. 14s. Normal, seller, September, October, 11s. 4d.

NEW YORK

The New York rubber market ruled as under on July 31.

Dealers' Prices

	US cents per lb., ex-dock	
	July 31	Previous
No. 1 RSS, Aug. ..	29¾n	29¼a
Sept. ..	29¼n	29¼a
No. 2 RSS, Aug. ..	29¼n	29¼n
Sept. ..	29nt	29¼n
No. 3 RSS, Aug. ..	29n	29¼n
Sept. ..	28⅞n	29n
No. 1 RSS, Spot ..	29¼n	29⅜n
No. 3 amber blanket crepe, Aug. ..	25¼n	25¼n

Futures—Rex Contract

	July 31	Prev. Close
Sept.	29.30t	29.45b–29.60a
Nov.	29.06t	29.35b–29.45a
Jan.	29.00t	29.15b–29.25a

Sales: Five. Tendency: Barely steady.

Rubber futures were steady on July 31 in very quiet early dealings. Physical rubber was steady and quiet. Futures were barely steady later in the day on scattered selling. Dealings for the day were very light.

SINGAPORE

The market ruled quiet and featureless throughout the morning of July 31. There were only minor fluctuations. Later in the day, there was a steadying tendency and sellers were reserved. There was fair interest for lower sheets and remilled grades. Very quiet conditions prevailed during the afternoon, but interest in lower grades continued. Sellers were reluctant, however, and the turnover was restricted. After hours, No. 1 for August delivery buyers was ⅛ cent below the previous final level at 83⅜ Malayan cents per lb.

	Malayan cents per lb., fob Malayan ports to open ports	
	July 31	Prev. Close
No. 1 RSS, Aug. ..	83⅛–83⅛	83⅛–83⅜
Sept. ..	84⅛–84⅛	84⅛–84⅜
No. 2 RSS, Aug. ..	83⅛–83⅛	83⅛–83⅜
No. 3 RSS, Aug. ..	82⅛–82⅛	82⅛–83
No. 4 RSS, Aug. ..	80⅛–80⅛	80 –80⅛
No. 5 RSS, Aug. ..	71⅛–72⅛	71⅛–72⅛
No. 1 RSS, Spot ..	82⅛–83⅛	83⅛–83⅛
No. 3 blanket thick remilled crepe, Aug.	70⅛–71⅛	70⅛–71⅛
No. 1 fine pale crepe, Aug.	90⅛–91⅛	91– 92
2x thin brown crepe, Aug.	68– 69	69⅛– 70

Tendency: Quiet

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob, at 163.80d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on July 31:

	Guilders per kilo	
No. 1 RMA	July 31	Previous
August	2.28	2.28
September	2.28	2.28
July/September ..	2.28	2.28
October	2.28	2.28
November	2.28	2.28

Sales: Nil. Tendency: Quiet.

DJAKARTA

	Rupiahs per kilo	
	July 31	Previous
Spot No. 1 Priok ..	33.50b	33.50b
Spot No. 2 Priok ..	32.50b	32.50b
Spot No. 3 Priok ..	31.50b	31.50b
No. 1 fine pale crepe, spot	32.00b	32.00b

Tendency: Quiet

CEYLON

The price of No. 1 RSS at Colombo on July 31 was 100¼ (100¾) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on July 31 was 26.75 (27.00) US cents per lb.

Webbing Comfort

An easy chair which won first prize (£300) in the recent Aeropreen Award Design Competition, makes extensive use of resilient rubber webbing by Pirelli.

The webbing has been arranged so that it is an intrinsic feature of the

design, enabling the main frame to be constructed without hard rails at the front of the seating unit or at the top backrest.

The 'cantilever' construction provides a slight rocking action which combines with the floating action provided by the webbing to give a chair of exceptional comfort.

It has been designed by W. F. Plunkett of the Kingston School of Art.

STOCK MARKET

Continued from page 228

vated by the large increase in dumping with overseas producers with heavily-protected domestic markets exporting their marginal production at low prices. The outlook, however, for the industrial group is considered to be favourable subject to a return of more normal conditions in a number of industries which the group supplies. In order to counteract the trend of world prices to lower levels, a policy of broadening the range of products and increasing production of certain existing materials is being pursued. By this means the company hopes to be in a position to increase the present trading volume substantially and to achieve further improvement in earnings.

Canadian Asbestos

Shipments of asbestos from Canadian mines were up slightly in May to 114,305 tons from 106,214 a year earlier, and were down slightly in the January-May period to 402,691 tons from 407,061 a year ago.

Mines in Quebec shipped 107,810 tons of asbestos in the month, against 100,365 a year earlier, and 372,865 tons in the five months against 378,590.

Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER AND PLASTICS WEEKLY *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. C/f duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated. Grades are expressed as follows:* 1001/2/6 = *grades* 1001, 1002 *and* 1006.

(e-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (e-i)—Ex-installation (ddp)—Delivered duty paid (e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered BM—black masterbatch CBM—cold, black masterbatch CNP—cold, non-pigmented CNS—cold, non-staining COE—cold, oil extended COELC—cold, oil extended, light coloured CO/BM—cold, oil/black masterbatch CPOE—cold, pigmented, oil extended CRE—cold, rosin extended dw—Dry weight HN—high nitrile HNP—high nitrile, powder HP—hot, pigmented HS—high styrene HMW—high mol. wt. LMW—low mol. wt. MHN—medium high nitrile MLN—medium low nitrile MMW—medium molecular weight MN—medium nitrile NS—non-staining TS—total solids RTV—room temp. vulc.

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf)		(e-qdp)
1000/1/6/7	Hot, non-oil	22.50
1002/12	,, ,,	22.75
1009	,, ,,	24.25
1011	,, ,,	23.25
1013	,, ,,	23.50
1019	,, ,,	24.75
1006/12	Hot, crumb	23.00
1009	,, ,,	25.00
1013	,, ,,	24.00
1500/1/2/9/11	Cold, non-oil	22.50
1605	BM, cold, non-oil	18.75
4658	,, ,,	19.25
1606/8	,,	18.25
1609	,,	20.25
1610	,,	18.75
4651	,,	17.75
4600G2, 4604	Cold, non-oil	22.50
1703	COE, 25% oil	19.75
1705	,, ,,	19.50
1707/8	,, 37.5% ,,	18.25
1710/12	,, ,,	18.00
4700	,, 50% ,,	16.75
4760	COBM, 17.5% oil	16.25
1805	,, 37.5% oil	16.00
1809	,, ,,	15.75
4756	,, ,,	15.75
4759	,, ,,	16.25
1808	,, 50% ,,	15.25
4758	,, 62.5% ,,	15.00

ASRC (American Synthetic Rubber Corpn.)		(e-sUK)
1004/6	Hot, non-oil	22.25
1009	,, ,,	24.0
1018	,, ,,	24.75
1019	,, ,,	24.5
1500/2/7	Cold, non-oil	22.25
1503	,, ,,	24.25
1703	COE	20.5
1708	,,	18.0
1712	,,	17.75
1713	,,	16.75
3014	Hot, non-oil	25.75
3105/6	Cold, non-Oil	22.25
3110	,, ,,	24.0

Cariflex (Shell Chemical)		(e-sUK)
S-1000	Hot	22.25
S-1002	,,	23.375
S-1006	,,	22.25
S-1009/11/13	,,	24.0
S-1500/2/9	Cold	22.25
S-1600/2	CBM	19.625
S-1605	,,	19.375
S-1606	,,	18.75
S-7652	,,	20.0
S-1703	COE	19.25
S-1707	,,	18.0
S-1709/12	,,	17.75
S-1803	COBM	17.875
S-1806	,,	16.625
S-1807	,,	17.375
S-1808	,,	15.25

Contract terms available.

FR-S (Firestone)		(delUK*)
1000/1/4/6/7 and 195	Hot	22.50
1500/2 and 146	Cold	22.50
1703 and 173	OE	19.11
1710/12 and 184	,,	18.00
178	,,	18.25
201	,,	16.71
1009 UK Specialty		23.06
1012 ,, ,,		22.59
1013 ,, ,,		23.59
1014 ,, ,,		26.18
181 ,, ,,		22.50
182 ,, ,,		23.29
147 ,, ,,		20.94
158 ,, ,,		28.00
158-S		27.50

*Import Duty not included

Int. Synthetic Rubber	(d)
Intol 1500/2	22.5
Intol 1509	22.5
Intol 1570	23.5
Intol 1006	22.5
Intol 1710	18.0
Intol 1712	18.0
Intol 1778	18.25

Naugapol (Naugatuck Chemical International)	(ex-WUK)
1016/9	28.5
1018	29.0
6003	29.0
1022	32.25
1023	34.5
1503	28.25
6102	28.25
1504	36.5
6101	24.5
6100	33.5
K-45	28.25
K-50	28.75
KO-50	29.25
1015	36.5
6004	27.0

ANIC	(e-qdp)
1500	22.25
1502	22.25
1708	18.00
1712	17.75
6630	23.25
6632	22.25
6700	16.375

Philprene (Phillips)		(d)
1000/6	Hot, non-pig.	22.50
1009	,, ,,	24.25
1018	,, ,,	26.97
1019	,, ,,	26.50
6701	,, ,,	24.23
1500/2	CNP	22.50
1503	,,	26.27
6630	,,	25.18
6632	,,	24.23
1601	CP	19.70
1603	,,	19.80
1605	,,	19.625
1606	,,	19.00
1608	,,	18.90
1609	,,	21.12
6662	,,	18.90
6655	,,	19.80
1703	COE	20.75
1708	,,	18.25
1712	,,	18.00
6700	,,	18.01
1803	CPOE	18.125
1805	,,	16.11
1808	,,	16.50
6608	,,	15.27
6753	,,	15.61
6754	,,	15.45
6755	,,	17.68

Plioflex (Goodyear)		(ex-wUK)
1006	Hot, non-oil	22.25
1019/1503	CNP, electrical	22.25
1500/2/7/10	CNP	22.25
1006S		22.75
1712C	COE	17.75
1708/78	,,	18.00
1713/15	,,	16.25
1714C	,,	16.00
1773	,,	19.25
224	HS(d)	27.00

Polysar (Polymer UK)	(e-sUK)
S Hot	22.25
S-630 Hot	22.25
Kryflex 200 Cold	23.5
Krylene	22.25
Krylene NS	22.25
Krylene 602 Cold	22.25
Krynol 651 COE	17.75
Krynol 652 ,,	18.0
S-X 371 Process Aid	24.0

Synpol (Texas-US Chemical)		(e-qdp)
1000/1	Hot	22.25
1002	,,	22.47
1006/7	,,	22.25
1009	,,	22.81
1012	,,	22.38
1013/61	,,	22.25
X274	,,	23.45
8000	,,	22.25
1500/02/51	Cold	22.25
1703	COE	19.25
1707/8	,,	18.0
1711	,,	17.88
1712	,,	17.75
8200	,,	18.0
8201	,,	16.6
8202	,,	16.38
8152	CBM	18.6
8151	COBM	18.2
8253	,,	15.84
8254	,,	15.45
8255	,,	14.8
8267	,,	16.4

(Masterbatch prices US cents per lb. fas Gulf ports)

SBR LATICES

Copo (Copolymer) (10-ton lots)		(cifUKdp)
2101	(dw)	46.3
X-765	,,	40.8
X-800	,,	37.2
2102/5	,,	38.0

Ciago	
SB75	38.00
SB69	36.00
SB57P BM	27.50
SB58P	29.75

Pliolite Rubber (Goodyear)	(d)
2000	40

Latex (dw)	
2001/4/5/8	40
5350	40

Pliolite Resin (Goodyear)	(d)
101A (dw)	44
150 ,,	50
151 ,,	35
160 ,,	50
170 ,,	50

Hycar (B. F. Goodrich)	(ddp)
2507 (HS) dw	48

Polysar (Polymer UK)	(e-sUK)
Latex, type IV	32.5 TS
Latex, type 722 (Non-returnable 45-gallon drums)	31.75 TS
	(e-i)
Latex, type 722 (bulk quantities)	28.75 TS

Int. Synthetic Rubber	(ex-wks)
Intol Latex M23B/R23/F28	22.25
Intol Latex 62A	27.0

Dylex (Koppers Int. CA)	(fas)
K-42A/52/51/900	31.6

ACRYLONITRILE TYPES

Butaprene N (Firestone)	(cifUKdp)
NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum	(e-s)
N—1	75
N—3A	52
N—5	52
N—6G/7/8/600X	45

Hycar (British Geon) (500-lb. lots and over)	(UKd)
1001 High Nitrile Hot	52
1041 ,, ,, Cold	52
1002 MHN Hot	45
1042 ,, Cold	45

Hycar (B. F. Goodrich) (500-lb. lots and over)	(ddp)
1411 HNP	66
1432 MHN (crumb)	64
1072 ,, (carboxyl)	66
1312 ,, (liquid)	55
1043 MLN	51
1014 Low Nitrile	61

I.C.I. (min., 5-cwt. lots)	(UKd)
Butakon A-4051 HN Cold	52
Butakon A-3051 MN Cold	45
Butakon A-3002 ,, ,,	45

Paracril (US Rubber)	(dwe-sUK)
18-80 Low Nitrile	61
AJ ,, ,,	50
B MLN	51
BJ ,,	51
BLT ,, Cold	51
BJLT ,, ,,	51
C MHN	59
CLT ,, Cold	59
CV ,, (crumb)	63
D High Nitrile	67
ALT	51
OZO	47

Polysar (Polymer UK)	(d)
Krynac 800 MN	45
Krynac 802 LN	45
Krynac 803 MN (low Mooney)	45
Krynac 801 HN	52
Krynac 804 (MN-cross linked)	45

ACRYLONITRILE LATICES

Butaprene N (Firestone)	(cifUKdp)
N-300 (dw)	53
N-400 ,,	60.5

Chemigum Latex (Goodyear)	(d)
200 (dw)	65
235/6 CHS ,,	60
245 B ,,	52
245/6/7/8 CHS ,,	52

Ciago	
AB61/71	60
AB62/77	52
217OH	60

Hycar (B.F. Goodrich) (dry weight, drum lots)	(ddp)
1551 High Nitrile	66
1552 MHN	57

Hycar (British Geon) (dry weight, 3 drums and over)	(UKd)
1561 High Nitrile	60
1571 ,, ,, (carboxyl)	60
1562 MHN	52
1577 (modified)	52

ACRYLIC TYPES

Hycar (B. F. Goodrich)	(ddp)
4021 Slab, 500 lb. and over	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso		(e-sUK)
Regular 035/150/215		21.75
Regular 217/8		21.75
Regular 325		21.75
Non-staining 165		22.75
Non-staining 268		22.75
Non-staining 365		22.75

Polysar (Polymer UK)		(e-sUK)
Butyl 100/200/300		21.75
Butyl 301/400	NS	21.75
Butyl 101	NS	26.25
Butyl 402	NS	22.5

Hycar (B. F. Goodrich) (500 lb. and over)	(ddp)
2202 Brominated	68

ISOPRENE RUBBER

Shell Chemical Co.	(e-sUK)
Cariflex	26.5

NEOPRENES

Du Pont (UK production)		(del)
W		38.5
WHV	,,	37.0
WX	,,	40.5
WRT	,,	44.0
GS	,,	41.0
GRT	,,	42.0

(USA production)		
AC AD (del)		57.125
S	,,	45.625
KNR	,,	75.625
CG	,,	57.125

Latices (UK)		
842A (dwdel)	45-gal. drums	41.0
842A	,, 2,000-gal. tanker	36.0
601A	,, 45-gal. drums	45.0
601A	,, 2,000-gal. tanker	40.0

Latices (USA)		
60 (dwdel)	45-gal. drums	51.875
400	,, ,, ,,	54.125
571	,, ,, ,,	49.75
572	,, ,, ,,	51.25
635	,, ,, ,,	53.625
650	,, ,, ,,	54.125
673	,, ,, ,,	62.0
735/6/50	,, ,, ,,	51.25
950	,, ,, ,,	58.25

SILICONE RUBBERS

Midland Silicones (500-lb. lots del)	
Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23d. 6d.

I.C.I. Silicones	
Gums (40-lb. lots del)	39s. 6d.-47s.
Stocks (250-lb. lots del)	22s.-35s.
Pastes (1000-lb. lots del)	27s.6d.-35s.9d.
Silcoset (RTV) (250-lb. lots del)	21s. to 24s.

REINFORCING RESINS AND RUBBERS

I.C.I. (min., 2-ton lots)	(UKd)
Butakon S-8551	36.5
Butakon S-7001	33.5

Hycar (B.F. Goodrich)	(ddp)
2007 (powder)	42.5

Pliolite (Goodyear)	(d)
S—6B	36.5

Polysar (Polymer UK)	(e-sUK)
SS-250 HS (bale)	27.25
SS-250 ,, (flake)	27.5
Kryflex 252 HS	25.5
Kryflex 202 (HMW Cold polymerized)	25.75

Cariflex (Shell Chemical)	(e-sUK)
SP-103	27.25

Cyclite (Durham Raw Materials)	
	42

HYPALON

	(ddp)
20	48
30	60.25
40	50.75

Industry INTELLIGENCE

Technical Data

Epoxies for Electrical Uses

A booklet available from Leicester, Lovell and Co. Ltd., North Baddesley, Southampton, describes their Epophen epoxy resin systems for electrical applications.

Epoxy resins are used in the electrical industry for potting and encapsulating components, surface coating, laminating and for adhesive applications. They have good electrical properties, high mechanical strength, low shrinkage, excellent chemical resistance and good adhesion to metals and to other non-porous materials.

The Epophen range includes three basic resins, Epophen 1075, a liquid bisphenol type, 1463, a solid bisphenol resin, and 1315 a solid resin of high functionality giving good performance at high temperatures.

A table included in the booklet gives details of these resins and the properties of cured products made from them using several hardener systems.

New Phenolic Resins

Schenectody-Midland Ltd., Oldbury, Birmingham, has recently announced the availability of a new resin, SP 134, details of which are given in a technical data leaflet issued by the company.

SP 134 is an oil soluble, heat reactive, phenolic resin developed primarily for the formulators of neoprene solvent-type adhesives. The resin is supplied in lump form, is easily handled and incorporated into solutions or compounded into rubber stock, and is soluble in many aromatic and aliphatic solvents.

The most widely accepted method of using the resin is to mill mix the neoprene and compounding ingredients and dissolve the resulting compound in a solvent. The resin is cut in a separate solution which is then combined with the rubber solutions. Adhesives prepared in this way using SP 134 are claimed to have outstanding qualities of lightness in colour, high heat resistance and good cohesive strength.

Pigments for Paints

Technical Information Sheet, Dyehouse No. 619, recently issued by the Dyehouse Department, Dyestuffs Division, Imperial Chemical Industries Ltd., describes pigments for distempers and emulsion paints.

The coloration of dry distempers with concentrated and reduced brands of pigments is described. Ordinary paste brands of pigments may be used to colour oil-bound distempers but this operation is simplified by the use of V brand pigment pastes, which are highly dispersed. The recommended products are listed.

Pigmentation of alkyd emulsion paints may be carried out in the same way but there is a danger that organic pigments may migrate from the aqueous into the oil phase, with consequent loss of strength in the can and strength development on brushing. This is most marked with organic yellow pigments. The technique used to prepare stainers of oxides of iron, which are free from this defect, is described.

The V brand pigment pastes may cause the coagulation of polyvinyl acetate emulsion paints, depending on the type and concentration of pigment and on the emulsion used. Methods of testing to determine whether this is likely to occur and, if so, the use of Lissapol N to stabilize the system are described. Light fastness data on pigmented emulsion paints are quoted and recipes are suggested to give certain standard shades.

Machines, Materials and Equipment

Oil Meter

An oil meter which can measure accurately the flow of fuel oil at rates as low as 1½ gallons per hour under heads as low as 2ft., is now available from Walker Crosweller and Co. Ltd., of Cheltenham.

Primarily intended for the measurement of the flow of fuel oil to burners,

the meter will provide for the first time an economic means of recording such information on many of the smaller industrial applications such as oil-fired boilers, furnaces and ovens.

The instrument, which is of the integrating type, is a specially calibrated version of the company's standard ¾in. Akron oil meter which is normally calibrated to read flows down to four gallons/hour. An inherent feature of the design of this meter is its nutating piston principle — a flat disc oscillating on its periphery — which makes it extremely sensitive.

This sensitivity coupled with lengthy and precise calibration has made the new version possible. It is said to be accurate to within ± 1%.

Flow Indicator

A 1in. Arkon Ball Flow indicator is now available from Walker Crosweller and Co. Ltd., of Cheltenham, in addition to their ¾in. range. This gives a

positive indication whether or not flow is taking place in pipelines.

The body of the indicator is made of gunmetal and flow is indicated by the movement of a white nylon ball under a toughened glass dome. The starting flow on liquid is half gallon per minute and on gas 2 cu. ft. per minute. If the flow stops the ball drops out of sight. The movement of the ball cannot be missed even in a bad light and at a distance.

Publications

Plastics in Building

A 69-page book has just been published by the Plastics Division of Imperial Chemical Industries dealing with the present and potential uses of plastics in the building industry. Copies may be obtained from the Publicity Department at Welwyn Garden City.

'While', says the introduction, 'it would be premature to claim that plastics can yet be classed as basic building materials, there is no doubt that they are assuming increasing importance, not only for non-structural applications, but also for certain types of structural purposes'.

There are certainly many varied applications described in the book which contains 29 separate articles on different uses of the wide range of I.C.I. materials. These include: pvc for industrial plumbing; acrylics for lighting; silicone masonry water repellants; polythene tube for cold water plumbing; properties and uses of polyurethane foams; plastics fittings and urea formaldehyde resins for constructional glueing.

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

APPOINTMENTS VACANT

6d. a word, Minimum 12/6 Box 2/-

APPLICATIONS are invited for the position—foreman, extrusion department of a rubber company in Surrey. Pension and bonus schemes in operation.—Write in confidence, giving full details of age, experience and present salary to Box 1195. (1195)

CHEMIST

Due to production expansion and diversification, an excellent opportunity has occurred for a chemist to join

The Lea Bridge Rubber Co. Ltd., 122 Lea Bridge Road, London, E.5

D.P.I. or L.I.R.I. are minimum standard requirements for applicants who should write giving full details to the Managing Director. (422)

EXPANDING North-East Lancashire plastics company requires a development engineer with experience of hand lay-up and match metal moulding in both epoxy and polyester resins. This is a senior appointment and only first-rate engineers need apply.—Box 418. (418)

HATCHAM Rubber Co., Ltd., Princes Way, Waddon, Croydon, seek the services of an experienced rubber chemist/technologist to assume technical control of works production and to carry out development work—mainly for the footwear and cable industries. An attractive salary, according to experience and qualifications, will be offered to a suitable applicant. (419)

PRESS room charge hand—calender operator. Applicants for these positions should have had considerable experience and be prepared to work day and night shifts with a fair amount of overtime.—Write giving details of age, experience and wage sought, to Hatcham Rubber Co. Ltd., Princes Way, Waddon, Croydon, Surrey. (420)

PRECISION Rubbers Limited, Bagworth, Leicester, have a vacancy for a young engineer to undertake development in connection with the production of precision rubber engineering components. The post provides considerable scope for one with initiative and would be filled best by someone with experience in the rubber industry, although this is not an essential requirement.—Apply in writing, giving age, particulars of education, training and qualifications, to the Technical Director. (1198)

ADHESIVE TECHNOLOGIST

Applications are invited by a leading synthetic resin manufacturer in the South of England to fill a vacancy in the Technical Service Department, for an adhesive technologist.

Applicants should preferably be between 24 and 32 and have experience of the adhesive industry with particular reference to the formulation and applications of PVA based adhesives.

A salary of the order of £1,250 is envisaged but will depend on experience and qualifications.

You are invited to write, giving relevant details to Box 426. (426)

APPOINTMENTS VACANT

(continued)

RUBBER technologist, age 23-35, required for work in the field of specialised synthetic rubber components. Ability to deal practically with technical enquiries and production problems essential. Good prospects can be offered to one with initiative.—Applicants should write, giving full details of age, education, training and experience to the Technical Director, Precision Rubbers Limited, Bagworth, Leicester. (1199)

WORKS manager. Applications are invited by a Scottish rubber company for a works manager. Applicants must have a good knowledge of production of all classes of mechanicals, hose, belting, etc. Excellent opportunity and prospects for further advancement for man with all-round experience of compounding, processing, manufacturing and cost control. Reply giving full details of experience, age, etc., in strictest confidence.—Box 752, Davis Publicity, 111 Union Street, Glasgow, C.1. (417)

APPOINTMENTS WANTED

6d. a word, Minimum 10/- Box 2/-

GRADUATE organic chemist, 32, Canadian, residing United States, fully experienced all mechanical goods and tyres, seeks responsible, challenging position anywhere in world.—Box 423. (423)

ARTICLES WANTED

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VANDYKE 6925 (739)

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6d. a word, Minimum 12/6 Box 2/-

BRIDGE 60in. x 22in. mill with 100 h.p. drive. 30in. x 24in. and 21in. single geared cracker with 200 h.p. drive. 8½in. Royle extruder with 120/40 h.p. drive. Shaw 48in. x 18in. 3-bowl calender with 30/15 h.p. drive. Pair of 50in. x 18in. single geared mills by Robinson with 140 h.p. drive, through Moss double helical gearbox. 42in. x 16in. single geared mill by Power Plant with 50 h.p. drive.—Reed Brothers (Engineering) Ltd. (Receiver and Manager—Mr. C. E. M. Hardie), Woolwich Industrial Estate, London, S.E.18. Tel. Woolwich 7611. (414)

COVENTRY Climax Diesel Forklift Truck. 5,000lbs. capacity. 12ft. lift. Brand new solid rubber tyres. 2 speeds forward, 2 speeds reverse. Tilting boom. Hydraulic steering. 48in. forks. Checked throughout. Stripped to bare metal and re-sprayed in Climax colours of grey and yellow. Excellent condition. Available in approximately 7 to 14 days. Price £1,000.—Speed Electrics (Dept. RP), Church Street, Basford, Nottingham. Tel.: 75716. (413)

MACHINERY FOR SALE
(continued)

HYDRAULIC presses, pumps, valves, new, also large second-hand stock.—Thompson and Son (Millwall) Ltd., Cuba St. London E.14. East 1844. (1137)

ONE Clark petrol fork-lift truck, capacity 5,000lbs. Height of lift 14ft., solid tyres, all in first-class condition.—Geo. H. Campbell & Co., Atlas Works, Carlisle Road, Airdrie. Telephone Airdrie 2277. (425)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

Donald Leaver Limited

1 LONDON ROAD, STAINES, MIDDX. Phone STAINES 55271-2

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MACHINERY FOR SALE
(continued)

UNUSED 60in. x 22in. single geared mixing mill, friction ratio 1.15 to 1, Vibro mounted, Lunn safety equipment, driven by 125 h.p. slip ring motor.—Box 415. (415)

MACHINERY WANTED
6d. a word, Minimum 12/6 Box 2/-

SECOND-HAND vacuum forming machines required. Minimum platen area 14in. x 20in. Equipment suitable for conversion considered.—All details and prices to Box 424. (424)

AGENCIES and REPRESENTATIVES
6d. a word, Minimum 12/6 Box 2/-

REPRESENTATIVE required by old-established company for general mechanical rubber goods and rubber roller coverings, etc., to cover the Lancashire area. Applicants must have experience in handling these lines. Apply with full details of previous experience, stating age and salary required. Car will be provided and company operates contributory pension scheme.—Box 421. (421)

PLEASE NOTE

INSTRUCTIONS FOR THE CLASSIFIED ADVERTISEMENTS MUST REACH US BY 10 A.M. WEDNESDAY MORNING OF EACH WEEK

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CRUDE RUBBER

LIQUID LATEX

SOLE CREPE

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